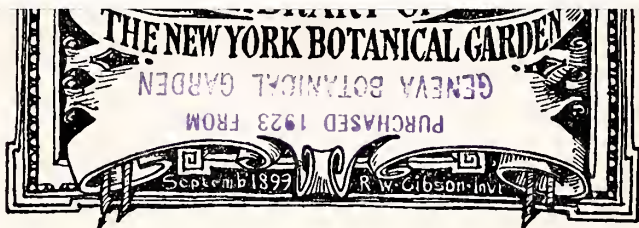
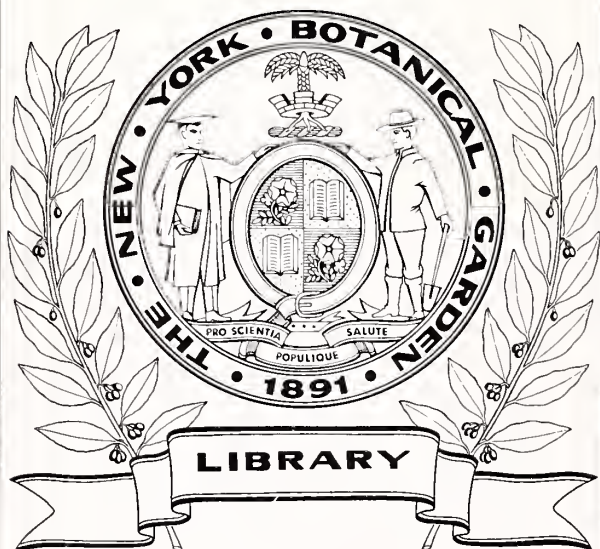




QK460

.H6





DUPLICATA DE LA BIBLIOTHÈQUE  
DU CONSERVATOIRE BOTANIQUE DE GENEVE  
VENDU EN 1922



HANDBOOK  
OF THE  
NEW ZEALAND FLORA.

*Part I., pp. 1-392, published 1864.*

*Part II., pp. 393 to end, published 1867.*

HANDBOOK  
OF THE  
NEW ZEALAND FLORA:

A SYSTEMATIC DESCRIPTION

OF THE

Native Plants

OF

NEW ZEALAND

AND THE

CHATHAM, KERMADEC'S, LORD AUCKLAND'S, CAMPBELL'S,  
AND MACQUARRIE'S ISLANDS.

BY

J. D. HOOKER, M.D., F.R.S. L.S. & G.S.,

AND HONORARY MEMBER OF THE PHILOSOPHICAL INSTITUTE OF CANTERBURY, NEW ZEALAND.

PUBLISHED

UNDER THE AUTHORITY OF THE GOVERNMENT OF NEW ZEALAND.




LONDON:

REEVE & CO., 5, HENRIETTA STREET, COVENT GARDEN.

1867.





Digitized by the Internet Archive  
in 2017 with funding from  
IMLS LG-70-15-0138-15

TO HIS EXCELLENCY  
SIR GEORGE GREY, K.C.B., D.C.L. OXON.,  
ETC. ETC. ETC.,  
GOVERNOR AND COMMANDER-IN-CHIEF OF THE  
COLONY OF NEW ZEALAND,  
WHO, THROUGHOUT A LONG AND DISTINGUISHED CAREER,  
IN THE COLONIES OF  
SOUTH AUSTRALIA, NEW ZEALAND, AND THE CAPE OF GOOD HOPE,  
HAS BEEN THE LIBERAL ENCOURAGER OF EVERY SCIENTIFIC UNDERTAKING,

THIS WORK

IS GRATEFULLY DEDICATED,  
BY HIS EXCELLENCY'S VERY FAITHFUL SERVANT,

J. D. HOOKER.

ROYAL GARDENS, KEW,

*July, 1864.*



LIBRARY  
NEW YORK  
BOTANICAL  
GARDEN

## PREFACE.

---

THE desirability of publishing a compendious account of the plants of New Zealand having been represented to the Colonial Government by Dr. Knight, F.L.S., Auditor-General, and other gentlemen interested in the Natural History of the Islands, and in the development of their resources, that Government was pleased to entrust me with the preparation of such a work, and to place at my disposal the necessary funds for its publication, including a liberal remuneration for my services. I was at the same time instructed to make Mr. Bentham's 'Hongkong Flora' my guide as to the form of the work and method of describing the plants, and to adhere in these and in all other matters to the plan\* recommended by Sir W. J. Hooker for publishing in a uniform series Floras of all the British Colonies. The title 'Handbook of the New Zealand Flora' is adopted in accordance with the wishes of its promoters.

Though as complete as the materials at my disposal enable me to make this book, it is still imperfect as to the descriptions of several Orders of Flowering plants; whilst with regard to the Flowerless, it is tolerably complete in the Orders Ferns and Lycopods only; of the others, the islands no doubt possess twice as many Mosses and Jungermannias as have hitherto been discovered; and I have been able to offer but a meagre sketch of the Fungi, of the lower tribes of Algæ, and of the more minute and especially crustaceous Lichens that grow on rocks and on the bark of trees. It must, however, be many years before the multitudinous New Zealand genera and species of these very obscure and imperfectly-known tribes of plants are fully known, and I have thought it best to give good descriptions of all the commoner and most conspicuous only, which can be easily found and studied, and to treat more generally the rarer and more obscure, of which I have but imper-

\* See 'Natural History Review,' 1861, p. 255.

AUG 7 - 1923

fect specimens, and which, were they perfect, could only be satisfactorily examined in a living state. I have, however, omitted no species known to me as a native of New Zealand, whether from books or collections. By adopting this plan I have, I hope, made this portion of the 'Hand-book' a fair introduction to the study of the Orders of New Zealand Flowerless plants, and a safe guide to the principal species; and I also hope that this will prove to be a more useful way of treating so very abstruse a subject, than would systematic descriptions, of equal length and pretensions to accuracy, of all the obscure and supposed species, whether common or scarce, perfect or imperfect.

In the course of preparing this work, I have re-examined most of the materials described in my '*Flora Novæ-Zelandiæ*;'\* these consisted of the collections of Banks and Solander, and of Forster, contained in the British Museum, and of those of the Cunninghams, Colenso, Sinclair, Bidwill, Dieffenbach, Raoul, Lyall, and my own, all preserved in the 'Hookerian Herbarium.' Since the publication of that work, little of novelty has been added to the Flora of the Northern Island, but very many interesting discoveries have been made in the Middle Island, adding fully one-third to the previously known number of New Zealand Flowering Plants.

Much remains to be done towards the Botany of the Northern Island especially; of the whole province Taranaki, nothing is known; and except the Ruahine range, by Colenso, no mountain region has been approximately well explored. Then too of the outlying islands, as the Kermadec and Chatham Islands, very little is known, and of Bounty or Antipodes Island nothing, whilst much remains to be collected on Lord Auckland's group, Campbell's Island and Macquarrie Island. The materials are still wanting for a comparison of the volcanic mountains of the Northern Island with the primitive or other mountains of the Middle Island, a comparison essential to make before the geological or climatic relations of the flora of either island can be ascertained. These subjects and those of the geographical distribution of New Zealand plants, and of the apparently recent development of many of its species by variation from others still existing in the islands, are, however, foreign to a purely systematic Handbook, and I shall hope to take them up when this is finished.

In the '*Flora Novæ-Zelandiæ*,' I have detailed at length the labours

\* This, which forms the second part of the '*Botany of the Antarctic Expedition of Sir J. Ross*,' was published in 1854-5, in two volumes, 4to, with 130 plates, coloured (including 1060 species), of New Zealand plants.



of all my predecessors, whether as collectors or authors, up to the year 1850, and shall therefore only briefly recapitulate them here.

In August 1769, SIR JOSEPH BANKS and his companion DR. SOLANDER visited the islands in Captain Cook's first voyage, and collected in Poverty Bay, Tegadoo, Tolaga, Oporagi, the Thames river, Bay of Islands, Queen Charlotte's Sound and Admiralty Bay. They obtained about 360 Flowering plants and ferns, had folio drawings made of most of them, and excellent manuscript descriptions. These MSS., together with about 200 engraved plates, were, I believe, all prepared for the press, and are preserved in the British Museum, but have never been published.

In 1772 Captain Cook again visited New Zealand, accompanied by the two FORSTERS, REINWOLD and GEORGE (father and son), and by DR. SPARRMAN; they collected at Dusky Bay and Queen Charlotte's Sound. Their herbarium amounted to only about 160 species of Flowering plants and ferns. Of these, 150 are published in Forster's '*Florulæ Insularum Australium Prodomus*;' and a few others in his '*Characteres Generum*,' and '*De Plantis Esculentis Insularum Oceani Australis Commentatio Botanica*.' The specimens were distributed to various museums, and being often carelessly named, much confusion has crept into descriptive works.

In 1777, Captain Cook, during his third voyage, visited New Zealand. On this occasion MR. ANDERSON, his surgeon, was the botanical collector, who obtained very little indeed, and nothing of any importance.

In 1791, Captain Vancouver arrived in Dusky Bay, on his way to survey the coasts of North-West America, having with him as surgeon MR. ARCHIBALD MENZIES, a very assiduous collector of Flowerless plants, who procured many species of *Filices*, *Musci*, and *Hepaticæ*, most of which are described at length, and beautifully illustrated in Hooker's '*Musci Exotici*,' and in Hooker and Greville's '*Icones Filicum*.'

In 1822, Captain Duperrey visited the islands in the French discovery corvette '*Coquille*,' when one of his officers, the late ADMIRAL D'URVILLE, made excellent collections.

In 1827, CAPTAIN (afterwards ADMIRAL) DUMONT D'URVILLE again visited New Zealand in the same ship, renamed the '*Astrolabe*,' accompanied by an able naturalist, M. LESSON, when additional botanical collections were made in Cook's Straits, the Thames river, and the Bay of Islands. The materials of this voyage (containing upwards of 200 Flowering plants and ferns) were published by M. A. Richard, in his '*Essai d'une Flore de la Nouvelle-Zélande*,' with folio plates (Paris,

1832). Some of Forster's plants, together with extracts from his MSS., preserved in the Paris Museum, were also published in this work.

In 1825, Mr. CHARLES FRASER, then superintendent of the Sydney Botanical Gardens, landed for one day in the Bay of Islands, made a small collection of dried plants. He, however, procured more living ones, some of which were amongst the first plants of the islands which were introduced into European gardens.

In 1826, and again in 1838, ALLAN CUNNINGHAM, the eminent Australian botanist and explorer, made extensive botanical explorations in the northern parts of the Northern Island, chiefly at the Bay of Islands; and in 1833, his brother, RICHARD CUNNINGHAM (Fraser's immediate successor in the Sydney gardens), was sent in H.M.S. Buffalo, to procure timber for the Government of Australia. The results of the labours of the brothers, and especially of Allan, whose arduous exertions in the islands led to his untimely death at Sydney in 1839, added considerably to the known Flora, and were collected by Allan into his '*Floræ Novæ-Zelandiæ Præcursor*,' which was published by Sir W. J. Hooker, partly in his '*Companion to the Botanical Magazine*,' vol. ii., and partly in the '*Annals and Magazine of Natural History*,' vols. i. ii. iii.

The herbarium of the Cunninghams, which has lately been presented by its possessor, R. HEWARD, Esq., F.L.S., to the Royal Gardens, Kew, had been lent to me by its liberal possessor during the preparation of the '*Flora Novæ-Zelandiæ*,' and I have again consulted it during the preparation of this work.

In 1840 and 1841, the French frigate '*L'Aube*,' and in 1842-3 another, the '*Allier*,' made a lengthened sojourn at the islands; during those occasions M. RAOUL, a very intelligent medical officer, diligently explored Banks's Peninsula and the Bay of Islands, making excellent collections at the former locality especially; most of the new species discovered were published first in the '*Annales des Sciences Naturelles*' (ser. iii. vol. ii. p. 113) by MM. Raoul and Decaisne, and more recently were described and figured in a beautiful work, entitled, '*Choix de Plantes de la Nouvelle-Zélande*,' which further contains thirty plates, and an enumeration of all then known New Zealand plants. The collections are preserved in the Paris Museum, and a set has been communicated to Sir W. Hooker's herbarium.

In 1841, the Antarctic Expedition visited the Bay of Islands, when, accompanied by my friend the Rev. W. Colenso, and by Dr. A. Sinclair during a part of the time, I was enabled to explore the neighborhood very fully, and to add largely to the Cryptogamic Flora.

In 1847-9, CAPTAIN STOKES, R.N., in H.M.S. Acheron, surveyed the coast of New Zealand; he was accompanied by Dr. Lyall, who made very large and excellent collections, especially of Flowerless plants, on various parts of the coast, but chiefly of the Middle Island.

The other collectors to whom I am principally indebted for the materials published in the '*Flora Novæ-Zelandiæ*,' are, firstly, the REV. W. COLENZO, who, during many successive years, has collected throughout the whole length of the Northern Island, with great care and skill, discovering more new and interesting plants (especially on the Ruahine Range, Tongariro, Hikurangi, etc.) than any botanist since Banks and Solander. In every respect Mr. Colenso is the foremost New Zealand botanical explorer, and the one to whom I am most indebted for specimens and information. The late DR. ANDREW SINCLAIR, R.N., F.L.S., formerly Colonial Secretary, a man of great attainments in many ways, certainly ranks second to Mr. Colenso. He collected very copiously in the Bay of Islands, the Auckland districts, and in the Nelson mountains, and was engaged in a botanical exploration of the Southern Alps in company with Mr. Haast, when he was drowned in the Rangitata river. His loss has been a very great one, whether as a botanist or as an enthusiastic and liberal patron of science.

The first alpine collections were made by my late friend J. T. BIDWILL, Esq., of Sydney, who was the earliest explorer of the interior of the Northern Island, and in 1839 ascended the lofty active volcano Tongariro, incurring considerable danger; at a later period he was the first explorer of the Southern Alps, making extensive and very important collections on the Nelson mountains, which were transmitted with copious notes to Sir W. Hooker.

The same mountains have been still better explored by DR. MUNRO, who has added many beautiful alpine species to the '*New Zealand Flora*,' and sent an excellent herbarium of Nelson plants to Sir W. Hooker.

In 1840, DR. DIEFFENBACH visited many parts of the Northern Island and northern part of the Middle Island, and is the first person who ascended Mount Egmont. His collections, which are however most scanty, compared with the great extent of interesting ground he passed over, were also communicated to Sir W. Hooker's herbarium. MR. LOGAN, MR. EDGERLEY, the REV. W. TAYLOR, the late GENERAL BOLTON, CAPT. HAULTAINE, CAPT. DRURY, R.N., MR. JOLLIFFE, CAPT. D. ROUGH, and MR. STEPHENSON, have all contributed interesting and important collections which are embodied in the '*Flora Novæ-Zelandiæ*.'

Since 1854, as I have before observed, no addition of importance has been made to our knowledge of the Flowering plants of the Northern Island; which I greatly regret, as much remains to be done in all the mountain districts in collecting the *Gramineæ*, *Cyperaceæ*, and *Cryptogamia* everywhere, and in observing the habits and characters of the species of *Veronica*, *Coprosma*, *Astelia*, and many other genera. As regards Flowerless plants, two valuable papers by MR. KNIGHT and MR. MITTEN, on some of the Lichens of Auckland,\* and by MR. RALPH† on the Tree-ferns, are almost the only published contributions made since that date to our knowledge of its Flora.

The Middle Island, on the other hand, has furnished several diligent explorers and many capital discoveries. DR. MUNRO has made further excellent collections on the Nelson mountains, as have DR. SINCLAIR and CAPT. ROUGH. To W. T. LUKE TRAVERS, Esq., F.L.S., of Canterbury, I am indebted for many fine plants discovered in the alpine ranges of Canterbury, Nelson, and Marlborough, during various excursions. Many of these being ticketed as to elevation, are the more valuable. His observations on the spread of introduced plants are extremely interesting, and will, I hope, be fully followed up.‡

The great opportunities enjoyed by the distinguished geologist and explorer, JULIUS HAAST, Esq., F.L.S., F.G.S., Government Geologist of Canterbury, have been used to the best advantage in the furtherance of botanical science, he having contributed more new species to the Flora of the islands than any collector since Mr. Colenso. I am indebted to him also for a series of maps, notes, and observations, especially respecting the ranges of the mountain plants, including the most alpine species hitherto discovered, which have been of great service. It is difficult to imagine how, with so many and such arduous duties as surveyor and geologist, Mr. Haast can have personally effected so much for botany as he has done, and I anticipate that his method of making complete collections on each mountain and on each line of march, will eventually do much to develop the extremely curious subject of the variations of New Zealand plants. Mr. Haast has further called my attention to the labours of his assistant MR. WILLIAM YOUNG, who has made several interesting discoveries, more particularly amongst the Grasses and Sedges of the alpine regions.

From the Otago province I have an excellent herbarium of Dunedin

\* Transactions of the Linnean Society of London, xxiii. 99 and 101.

† Journal of Linnean Society of London, Bot. iii. 163.

‡ See 'Natural History Review,' January, 1864.



plants, made by DR. LAUDER LINDSAY, F.L.S.; and more recently very extensive and valuable collections, containing much novelty, from the Alps of the interior and west coasts, by another eminent geologist, DR. HECTOR, F.G.S., Government Geologist, and MR. BUCHANAN, his assistant. The most important of these last collections arrived whilst the sheets of this work were passing through the press, and have materially delayed its publication; for the discoveries which they contained seemed to me to be of sufficient importance to render it desirable that they should be embodied in the portions that had already been printed, which had to be recalled for the purpose. Again, since the completion of the Flowering plants, I have received two more contributions from these surveyors, including various new discoveries and new habitats, which must be reserved for the Supplement.

To render this Handbook more complete, I have included in it the plants of the outlying islands properly belonging to the New Zealand group. They are the following:—

**Chatham Islands**, whence I have a very few plants collected by DR. DIEFFENBACH. The splendid *Myosotidium nobile* inhabits this group, which is well worthy of a careful exploration. This, through the liberality of MR. TRAVERS, has been done by his son, who, he tells me, has returned from the group with considerable collections.

**Kermadec Islands.** One of these, Sunday or Raoul Island, was visited by Captain Denham, in H.M.S. Herald, and botanized on by MR. MACGILLIVRAY, naturalist, and his assistant, MR. MILNE; its Flora, though characteristic of New Zealand, is more tropical than the latter, containing the widely-diffused *Metrosideros polymorpha*, and several tropical Ferns of the Pacific islands. I published a list of its plants in the Linnean Society's Journal, Botany, vol. i. p. 125.

**Lord Auckland's Group and Campbell's Island** were explored by DR. LYALL and myself, during the stay there of the Antarctic Expedition, in the year 1840. Our collections amounted to 370 species, and are published in the first volume of the 'Antarctic Flora,' with 80 plates of 150 species. Lord Auckland's group had been visited in the previous year by Admiral D'Urville's Antarctic Expedition, but the collections made by his naturalists, MM. HOMBRON and JACQUINOT, were extremely small. The Cryptogamia alone are described, by M. MONTAGNE, in a work entitled 'Voyage au Pôle Sud,' Bot. Crypt., 8vo, Paris, 1845, with a folio atlas of 20 plates: figures of some of the Flowering plants and Ferns have likewise been published in the same form,



but without descriptions. Lord Auckland's group was also visited, in the same year, by Commodore Wilkes's Expedition, when very few, if any, plants appear to have been collected; and more recently by GEN. BOLTON, who added several species to the Flora of the group.

Considering how many beautiful plants different from those of New Zealand these islands contain, it is obvious that they deserve a very close and careful botanical scrutiny.\*

**Macquarrie's Island.** A few plants from this desolate spot were sent to Sir W. Hooker by MR. FRASER, when Superintendent of the Sydney Botanic Garden.

Of Bounty or Antipodes Islands nothing whatever seems to be botanically or geographically known.

The Flora of Lord Howe's Islands is intermediate in character (as the islands are in position) between that of New Zealand and Australia, but much more nearly allied to the latter; whilst Norfolk Island, which should perhaps have been included in the New Zealand group, is much more tropical and may have equal claims to rank botanically with the New Caledonian or Fiji Islands.

Of the 303 New Zealand genera of Flowering plants described in this part, about 252 (containing 222 species and 51 representatives) are common to Australia; 174 (containing 11 species and 32 representatives) to South America; 31 are peculiar to the group (comprising 59 species), and 6 (with 20 species) are found in the Pacific islands and elsewhere, but not in Australia or South America.

Again, of the 935 species of Flowering plants, 677 are peculiar to the islands; 222 are Australian; and 111 American. There are further 51 Australian representative and 32 American representative species.

Comparing New Zealand with Europe, these countries have 115 genera and 58 species in common, the latter including many water-plants, and several land-plants which are doubtful natives. Of these European genera, the shrubby Veronicas and *Ligusticum* are the only ones that appear to be vastly more numerous in New Zealand than in Europe.

It remains for me to apologize for many imperfections that will be

\* Of about one hundred Flowering plants, natives of these small groups, no less than twenty-seven are hitherto unknown in New Zealand proper, including three genera and twelve most conspicuous and singular species, viz., *Ligusticum latifolium* and *antipodum*; *Pleurophyllum* two species, *Celmisia vernicosa*, *Gentiana* two species, *Plantago Antaretica*, *Chiloglottis cornuta*, *Anthericum Rossii*, *Rostkovia* two species.

found in this work, and to express a hope that these will be pointed out to me when discovered, so that they may be corrected in a future edition. Of the two principal sources of error in any work of the nature of a Systematic Flora, one is unavoidable, and that is the impossibility of deciding, in many cases, as to what should be regarded a species and what a variety; in my case this difficulty is greatly enhanced by my having only dried specimens to examine. But this is not all; for it is now admitted that one and the same species may be represented by two or more permanently distinct forms in one district, in other districts by but one of these forms, and in still other districts by forms which unite the characters of the most distinct forms of the first district; and moreover, that these forms are usually permanent under cultivation. It hence follows that the several characters will have different values in the estimation of the observers in each district, and that there must always be differences of opinion regarding the claims of such forms to take specific rank. The other great source of error is of more real importance, as it relates to facts and not at all to opinions; it is, that in examining dried specimens, important and constant characters are often overlooked, unimportant and transient ones exaggerated, and that errors accumulate in the successive process of examining so many organs, in applying technical terms to them, and in describing, transcribing, printing, and even in correcting the press. The number of these errors is always great in works which, like the Phænogamic Part of this Handbook, consist of descriptions of plants, two-thirds of which have been examined and described by one author alone, and it is to succeeding observers that I must look for their detection and correction.

*Royal Gardens, Kew:*

*June 30, 1864.*



OUTLINES OF BOTANY,  
TO ACCOMPANY THE COLONIAL FLORAS.  
FROM BENTHAM'S 'FLORA AUSTRALIENSIS.'

---

CHAP. I. DEFINITIONS AND DESCRIPTIVE BOTANY.

1. The principal object of a **Flora** of a country, is to afford the means of *determining* (i. e. ascertaining the name of) any plant growing in it, whether for the purpose of ulterior study or of intellectual exercise.

2. With this view, a Flora consists of descriptions of all the wild or native plants contained in the country in question, so drawn up and arranged that the student may identify with the corresponding description any individual specimen which he may gather.

3. These descriptions should be *clear, concise, accurate, and characteristic*, so as that each one should be readily adapted to the plant it relates to, and to no other one; they should be as nearly as possible arranged under *natural* (184) divisions, so as to facilitate the comparison of each plant with those nearest allied to it; and they should be accompanied by an *artificial key* or index, by means of which the student may be guided step by step in the observation of such peculiarities or *characters* in his plant, as may lead him, with the least delay, to the individual description belonging to it.

4. For descriptions to be clear and readily intelligible, they should be expressed as much as possible in ordinary well-established language. But, for the purpose of accuracy, it is necessary not only to give a more precise technical meaning to many terms used more or less vaguely in common conversation, but also to introduce purely technical names for such parts of plants or forms as are of little importance except to the botanist. In the present chapter it is proposed to define such *technical* or *technically limited* terms as are made use of in these Floras.

5. At the same time mathematical accuracy must not be expected. The forms and appearances assumed by plants and their parts are infinite. Names cannot be invented for all; those even that have been proposed are too numerous for ordinary memories. Many are derived from supposed resemblances to well-known forms or objects. These resemblances are differently appreciated by different persons, and the same term is not only differently applied by two different botanists, but it frequently happens that the same writer is led on different occasions to give somewhat different meanings to the same word. The botanist's endeavours should always be, on the one hand, to make as near an approach to precision as circumstances will allow, and on the other hand to avoid that prolixity of detail and overloading with technical terms which tends rather to confusion than clearness. In this he will be more or less successful. The aptness of a botanical description, like the beauty of a work of imagination, will always vary with the style and genius of the author.

§ 1. *The Plant in General.*

6. The **Plant**, in its botanical sense, includes every being which has *vegetable life*, from the loftiest tree which adorns our landscapes, to the humblest moss which grows on its stem, to the mould or fungus which attacks our provisions, or the green scum that floats on our ponds.

7. Every portion of a plant which has a distinct part or *function* to perform in the operations or phenomena of vegetable life is called an **Organ**.

8. What constitutes *vegetable life*, and what are the functions of each organ, belong to *Vegetable Physiology*; the microscopical structure of the tissues composing the organs, to *Vegetable Anatomy*; the composition of the substances of which they are formed, to *Vegetable Chemistry*; under *Descriptive and Systematic Botany* we have chiefly to consider the forms of organs, that is, their *Morphology*, in the proper sense of the term, and their general structure so far as it affects classification and specific resemblances and differences. The terms we shall now define belong chiefly to the latter branch of Botany, as being that which is essential for the investigation of the Flora of a country. We shall add, however, a short chapter on Vegetable Anatomy and Physiology, as a general knowledge of both imparts an additional interest to and facilitates the comparison of the characters and affinities of the plants examined.

9. In the more perfect plants, their organs are comprised in the general terms **Root, Stem, Leaves, Flowers, and Fruit**. Of these the three first, whose function is to assist in the growth of the plant, are *Organs of Vegetation*; the flower and fruit, whose office is the formation of the seed, are the *Organs of Reproduction*.

10. All these organs exist, in one shape or another, at some period of the life of most, if not all, *flowering plants*, technically called *phanogamous* or *phanerogamous plants*; which all bear some kind of flower and fruit in the botanical sense of the term. In the lower classes, the ferns, mosses, fungi, moulds or mildews, seaweeds, etc., called by botanists *cryptogamous plants*, the flowers, the fruit, and not unfrequently one or more of the organs of vegetation, are either wanting, or replaced by organs so different as to be hardly capable of bearing the same name.

11. The observations comprised in the following pages refer exclusively to the flowering or phanogamous plants. The study of the cryptogamous classes has now become so complicated as to form almost a separate science. They are therefore not included in these introductory observations, nor, with the exception of ferns, in the present Flora.

12. **Plants** are

*Monocarpic*, if they die after one flowering-season. These include *Annuals*, which flower in the same year in which they are raised from seed; and *Biennials*, which only flower in the year following that in which they are sown.

*Caulocarpic*, if, after flowering, the whole or part of the plant lives through the winter and produces fresh flowers another season. These include *Herbaceous perennials*, in which the greater part of the plant dies after flowering, leaving only a small perennial portion called the Stock or Caudex, close to or within the earth; *Undershrubs*, *suffruticose* or *suffrutescent* plants, in which the flowering branches, forming a considerable portion of the plant, die down after flowering, but leave a more or less prominent perennial and woody base; *Shrubs* (*frutescent* or *fruticose plants*), in which the perennial woody part forms the greater part of the plant, but branches near the base, and does not much exceed a man's height; and *Trees* (*arboreous* or *arborescent plants*) when the height is greater and forms a woody *trunk*, scarcely branching from the base. *Bushes* are low, much branched shrubs.

13. The terms *Monocarpic* and *Caulocarpic* are but little used, but the other distinctions enumerated above are universally attended to, although more useful to the gardener than to the botanist, who cannot always assign to them any precise character. Monocarpic plants, which require more than two or three years to produce their flowers, will often, under certain circumstances, become herbaceous perennials, and are generally confounded with them. Truly perennial herbs will often commence flowering the first year, and have then all the appearance of annuals. Many tall shrubs



and trees lose annually their flowering branches like undershrubs. And the same botanical species may be an annual or a perennial, a herbaceous perennial or an undershrub, an undershrub or a shrub, a shrub or a tree, according to climate, treatment, or variety.

14. Plants are usually *terrestrial*, that is, growing on earth, or *aquatic*, *i. e.* growing in water; but sometimes they may be found attached by their roots to other plants, in which case they are *epiphytes* when simply growing upon other plants without penetrating into their tissue, *parasites* when their roots penetrate into and derive more or less nutriment from the plant to which they are attached.

15. The simplest form of the perfect plant, the annual, consists of—

(1) The **Root**, or descending axis, which grows downwards from the stem, divides and spreads in the earth or water, and absorbs food for the plant through the extremities of its branches.

(2) The **Stem**, or ascending axis, which grows upwards from the root, branches and bears first one or more leaves in succession, then one or more flowers, and finally one or more fruits. It contains the tissues or other channels (217) by which the nutriment absorbed by the roots is conveyed in the form of *sap* (192) to the leaves or other points of the surface of the plant, to be *elaborated* or *digested* (218), and afterwards redistributed over different parts of the plant for its support and growth.

(3) The **Leaves**, usually flat, green, and horizontal, are variously arranged on the stem and its branches. They *elaborate* or *digest* (218) the nutriment brought to them through the stem, absorb carbonic acid gas from the air, exhaling the superfluous oxygen, and returning the assimilated sap to the stem.

(4) The **Flowers**, usually placed at or towards the extremities of the branches. They are destined to form the future seed. When perfect and complete, they consist: 1st, of a *pistil* in the centre, consisting of one or more *carpels*, each containing the germ of one or more seeds; 2nd, of one or more *stamens* outside the pistil, whose action is necessary to *fertilize* the pistil or enable it to ripen its seed; 3rd, of a *perianth* or *floral envelope*, which usually encloses the stamens and pistil when young, and expands and exposes them to view when fully formed. This complete perianth is double; the outer one, called *Calyx*, is usually more green and leaf-like; the inner one, called the *Corolla*, more conspicuous, and variously coloured. It is the perianth, and especially the corolla, as the most showy part, that is generally called the flower in popular language.

(5) The **Fruit**, consisting of the pistil or its lower portion, which persists or remains attached to the plant after the remainder of the flower has withered and fallen off. It enlarges and alters more or less in shape or consistence, becomes a *seed-vessel*, enclosing the seed until it is ripe, when it either opens to discharge the seed or falls to the ground with the seed. In popular language the term *fruit* is often limited to such seed-vessels as are or look juicy and eatable. Botanists give that name to all seed-vessels.

16. The herbaceous perennial resembles the annual during the first year of its growth; but it also forms (usually towards the close of the season), on its *stock* (the portion of the stem and root which does not die), one or more *buds*, either exposed, and then popularly called *eyes*, or concealed among leaves. These buds, called *leaf-buds*, to distinguish them from *flower-buds* or unopened flowers, are future branches as yet undeveloped; they remain dormant through the winter, and the following spring grow out into new stems bearing leaves and flowers like those of the preceding year, whilst the lower part of the stock emits fresh roots to replace those which had perished at the same time as the stems.

17. Shrubs and trees form similar leaf-buds either at the extremity of their branches, or along the branches of the year. In the latter case these buds are usually *axillary*, that is, they appear in the *axil* of each leaf, *i. e.* in the angle formed by the leaf and the branch. When they appear at any other part of the plant they are called *adventitious*. If these buds by producing roots (19) become distinct plants before separating from the parent, or if adventitious leaf-buds are produced in the place of flowers or seeds, the plant is said to be *viviparous* or *proliferous*.

§ 2. *The Root.*

18. **Roots** ordinarily produce neither buds, leaves, nor flowers. Their branches, called *fibres* when slender and long, proceed irregularly from any part of their surface.

19. Although roots proceed usually from the base of the stem or stock, they may also be produced from the base of any bud, especially if the bud lie along the ground, or is otherwise placed by nature or art in circumstances favourable for their development, or indeed occasionally from almost any part of the plant. They are then often distinguished as *adventitious*, but this term is by some applied to all roots which are not in prolongation of the original radicle.

20. **Roots** are

*fibrous*, when they consist chiefly of slender fibres.

*tuberous*, when either the main root or its branches are thickened into one or more short fleshy or woody masses called *tubers* (25).

*taproots*, when the main root descends perpendicularly into the earth, emitting only very small fibrous branches.

21. The stock of a herbaceous perennial, or the lower part of the stem of an annual or perennial, or the lowest branches of a plant, are sometimes underground and assume the appearance of a root. They then take the name of *rhizome*. The rhizome may always be distinguished from the true root by the presence or production of one or more buds, or leaves, or scales.

§ 3. *The Stock.*

22. The **Stock** of a herbaceous perennial, in its most complete state, includes a small portion of the summits of the previous year's roots, as well as of the base of the previous year's stems. Such stocks will increase yearly, so as at length to form dense tufts. They will often preserve through the winter a few leaves, amongst which are placed the buds which grow out into stems the following year, whilst the under side of the stock emits new roots from or amongst the remains of the old ones. These perennial stocks only differ from the permanent base of an undershrub in the shortness of the perennial part of the stems and in their texture usually less woody.

23. In some perennials, however, the stock consists merely of a branch, which proceeds in autumn from the base of the stem either aboveground or underground, and produces one or more buds. This branch, or a portion of it, alone survives the winter. In the following year its buds produce the new stem and roots, whilst the rest of the plant, even the branch on which these buds were formed, has died away. These *annual stocks*, called sometimes *hybernacula*, *offsets*, or *stolons*, keep up the communication between the annual stem and root of one year and those of the following year, thus forming altogether a perennial plant.

24. The stock, whether annual or perennial, is often entirely underground or root-like. This is the *rootstock*, to which some botanists limit the meaning of the term *rhizome*. When the stock is entirely root-like, it is popularly called the *crown* of the root.

25. The term *tuber* is applied to a short, thick, more or less succulent rootstock or rhizome, as well as to a root of that shape (20), although some botanists propose to restrict its meaning to the one or to the other. An *Orchis* tuber, called by some a *knob*, is an annual tuberous rootstock with one bud at the top. A potato is an annual tuberous rootstock with several buds.

26. A *bulb* is a stock of a shape approaching to globular, usually rather conical above and flattened underneath, in which the bud or buds are concealed, or nearly so, under *scales*. These scales are the more or less thickened bases of the decayed leaves of the preceding year, or of the undeveloped leaves of the future year, or of both. Bulbs are annual or perennial, usually underground or close to the ground, but occasionally buds in the axils of the upper leaves become transformed into bulbs. Bulbs are said to be *scaly* when their scales are thick and loosely imbricated, *tunicated* when the scales are thinner, broader, and closely rolled round each other in concentric layers.

27. A *corm* is a tuberous rootstock, usually annual, shaped like a bulb, but in which the bud or buds are not covered by scales, or of which the scales are very thin and membranous.

§ 4. *The Stem.*

28. **Stems** are

*erect*, when they ascend perpendicularly from the root or stock; *twiggy* or *virgate*, when at the same time they are slender, stiff, and scarcely branched.

*sarmentose*, when the branches of a woody stem are long and weak, although scarcely climbing.

*decumbent* or *ascending*, when they spread horizontally, or nearly so, at the base, and then turn upwards and become erect.

*procumbent*, when they spread along the ground the whole or the greater portion of their length; *diffuse*, when at the same time very much and rather loosely branched.

*prostrate*, when they lie still closer to the ground.

*creeping*, when they emit roots at their nodes. This term is also frequently applied to any rhizomes or roots which spread horizontally.

*tufted* or *caespitose*, when very short, close, and many together from the same stock.

29. Weak climbing stems are said to *twine*, when they support themselves by winding spirally round any object; such stems are also called *voluble*. When they simply climb without twining, they support themselves by their leaves, or by special clasping organs called *tendrils* (169), or sometimes, like the Ivy, by small root-like excrescences.

30. *Suckers* are young plants formed at the end of creeping; underground rootstocks. *Scions*, *runners*, and *stolons*, or *stoles*, are names given to young plants formed at the end or at the nodes (31) of branches or stocks creeping wholly or partially above-ground, or sometimes to the creeping stocks themselves.

31. A *node* is a point of the stem or its branches at which one or more leaves, branches, or leaf-buds (16) are given off. An *internode* is the portion of the stem comprised between two nodes.

32. **Branches or leaves** are

*opposite*, when two proceed from the same node on opposite sides of the stem.

*whorled* or *verticillate* (in a *whorl* or *verticil*), when several proceed from the same node, arranged regularly round the stem; *geminate*, *ternate*, *fascicled*, or *fasciculate*, when two, three, or more proceed from the same node on the same side of the stem. A tuft of fasciculate leaves is usually in fact an axillary leafy branch, so short that the leaves appear to proceed all from the same point.

*alternate*, when one only proceeds from each node, one on one side and the next above or below on the opposite side of the stem.

*decussate*, when opposite, but each pair placed at right angles to the next pair above or below it; *distichous*, when regularly arranged one above another in two opposite rows, one on each side of the stem; *tristichous*, when in three rows, etc. (92).

*scattered*, when irregularly arranged round the stem; frequently, however, botanists apply the term *alternate* to all branches or leaves that are neither opposite nor whorled.

*second*, when all start from or are turned to one side of the stem.

33. **Branches** are *dichotomous*, when several times forked, the two branches of each fork being nearly equal; *trichotomous*, when there are three nearly equal branches at each division instead of two; but when the middle branch is evidently the principal one, the stem is usually said to have two opposite branches; *umbellate*, when divided in the same manner into several nearly equal branches proceeding from the same point. If, however, the central branch is larger than the two or more lateral ones, the stem is said to have opposite or whorled branches, as the case may be.

34. A *culm* is a name sometimes given to the stem of Grasses, Sedges, and some other Monocotyledonous plants.

§ 5. *The Leaves.*

35. The ordinary or perfect **Leaf** consists of a flat *blade* or *lamina*, usually green, and more or less horizontal, attached to the stem by a stalk called a *footstalk* or *petiole*. When the form or dimensions of a leaf are spoken of, it is generally the blade that is meant, without the petiole or stalk.

36. The end by which a leaf, a part of the flower, a seed, or any other organ, is



attached to the stem or other organ, is called its *base*, the opposite end is its *apex* or summit, excepting sometimes in the case of anther-cells (115).

**37. Leaves are**

*sessile*, when the blade rests on the stem without the intervention of a petiole.

*amplexicaul* or *stem-clasping*, when the sessile base of the blade clasps the stem horizontally.

*perfoliate*, when the base of the blade not only clasps the stem, but closes round it on the opposite side, so that the stem appears to pierce through the blade.

*decurrent*, when the edges of the leaf are continued down the stem so as to form raised lines or narrow appendages, called *wings*.

*sheathing*, when the base of the blade, or of the more or less expanded petiole, forms a vertical sheath round the stem for some distance above the node.

38. Leaves and flowers are called *radical*, when inserted on a rhizome or stock, or so close to the base of the stem as to appear to proceed from the root, rhizome, or stock; *cauline*, when inserted on a distinct stem. Radical leaves are *rosulate* when they spread in a circle on the ground.

**39. Leaves are**

*simple* and *entire*, when the blade consists of a single piece, with the margin nowhere indented, *simple* being used in opposition to *compound*, *entire* in opposition to *dentate*, *lobed*, or *divided*.

*ciliate*, when bordered with thick hairs or fine hair-like teeth.

*dentate* or *toothed*, when the margin is only cut a little way in, into what have been compared to teeth. Such leaves are *serrate*, when the teeth are regular and pointed like the teeth of a saw; *crenate*, when regular and blunt or rounded (compared to the battlements of a tower); *serrulate* and *crenulate*, when the serratures or crenatures are small; *sinuate*, when the teeth are broad, not deep, and irregular (compared to bays of the coast); *wavy* or *undulate*, when the edges are not flat, but bent up and down (compared to the waves of the sea).

*lobed* or *cleft*, when more deeply indented or divided, but so that the incisions do not reach the midrib or petiole. The portions thus divided take the name of *lobes*. When the lobes are narrow and very irregular, the leaves are said to be *lacinate*. The spaces between the teeth or lobes are called *sinuses*.

*divided* or *dissected*, when the incisions reach the midrib or petiole, but the parts so divided off, called *segments*, do not separate from the petiole, even when the leaf falls, without tearing.

*compound*, when divided to the midrib or petiole, and the parts so divided off, called *leaflets*, separate, at least at the fall of the leaf, from the petiole, as the whole leaf does from the stem, without tearing. The common stalk upon which the leaflets are inserted is called the *common petiole* or the *rhachis*; the separate stalk of each leaflet is a *petiolule*.

40. Leaves are more or less marked by *veins*, which, starting from the stalk, diverge or branch as the blade widens, and spread all over it more or less visibly. The principal ones, when prominent, are often called *ribs* or *nerves*, the smaller branches only then retaining the name of *veins*, or the latter are termed *veinlets*. The smaller veins are often connected together like the meshes of a net, they are then said to *anastomose*, and the leaf is said to be *reticulate* or *net-veined*. When one principal vein runs direct from the stalk towards the summit of the leaf, it is called the *midrib*. When several start from the stalk, diverge slightly without branching, and converge again towards the summit, they are said to be *parallel*, although not mathematically so. When 3 or 5 or more ribs or nerves diverge from the base, the leaf is said to be *3-nerved*, *5-nerved*, etc., but if the lateral ones diverge from the midrib a little above the base, the leaf is *triplinerved*, *quintuplinerved*, etc. The arrangement of the veins of a leaf is called their *venation*.

**41. The Leaflets, Segments, Lobes, or Veins of leaves are**

*pinnate* (feathered), when there are several succeeding each other on each side of the midrib or petiole, compared to the branches of a feather. A pinnately lobed or divided leaf is called *lyrate* when the terminal lobe or segment is much larger and broader than the lateral ones, compared, by a stretch of imagination, to a lyre; *run-*

*cinate*, when the lateral lobes are curved backwards towards the base of the leaf; *pectinate*, when the lateral lobes are numerous, narrow, and regular, like the teeth of a comb.

*palmate* or *digitate*, when several diverge from the same point, compared to the fingers of the hand.

*ternate*, when three only start from the same point, in which case the distinction between the palmate and pinnate arrangement often ceases, or can only be determined by analogy with allied plants. A leaf with ternate lobes is called *trifid*. A leaf with three leaflets is sometimes improperly called a ternate leaf: it is the leaflets that are ternate; the whole leaf is *trifoliolate*. Ternate leaves are leaves growing three together.

*pedate*, when the division is at first ternate, but the two outer branches are forked, the outer ones of each fork again forked, and so on, and all the branches are near together at the base, compared vaguely to the foot of a bird.

42. Leaves with pinnate, palmate, pedate, etc., leaflets, are usually for shortness called *pinnate*, *palmate*, *pedate*, etc., *leaves*. If they are so cut into segments only, they are usually said to be *pinnatisect*, *palmatisect*, *pedatisect*, etc., although the distinction between segments and leaflets is often unheeded in descriptions, and cannot indeed always be ascertained. If the leaves are so cut only into lobes, they are said to be *pinnatifid*, *palmatifid*, *pedatifid*, etc.

43. The teeth, lobes, segments, or leaflets, may be again toothed, lobed, divided, or compounded. Some leaves are even three or more times divided or compounded. In the latter case they are termed *decompound*. When twice or thrice pinnate (*bipinnate* or *tripinnate*), each primary or secondary division, with the leaflets it comprises, is called a *pinna*. When the pinna of a leaf or the leaflets of a pinna are in pairs, without an odd terminal pinna or leaflet, the leaf or pinna so divided is said to be *abruptly pinnate*; if there is an odd terminal pinna or leaflet, the leaf or pinna is *unequally pinnate* (*imparipinnatum*).

44. The number of leaves or their parts is expressed adjectively by the following numerals, derived from the Latin:—

uni-	bi-	tri-	quadri-	quinque-	sex-	septem-	octo-	novem-	decem-	multi-
1-	2-	3-	4-	5-	6-	7-	8-	9-	10-	many-

prefixed to a termination, indicating the particular kind of part referred to. Thus—  
*unidentate*, *bidentate*, *multidentate*, mean one-toothed, two-toothed, many-toothed, etc.

*bifid*, *trifid*, *multifid*, mean two-lobed, three-lobed, many-lobed, etc.

*unifoliolate*, *bifoliolate*, *multifoliolate*, mean having one leaflet, two leaflets, many leaflets, etc.

*unifoliolate*, *bifoliolate*, *multifoliolate*, mean having one leaf, two leaves, many leaves, etc.

*biterminate* and *triterminate*, mean twice or thrice ternately divided.

*unijugate*, *bijugate*, *multijugate*, etc., pinnae or leaflets, mean that they are in one, two, many, etc., pairs (*iuga*).

45. **Leaves** or their parts, when **flat**, or any other flat organs in plants, are

*linear*, when long and narrow, at least four or five times as long as broad, falsely compared to a mathematical line, for a linear leaf has always a perceptible breadth.

*lanceolate*, when about three or more times as long as broad, broadest below the middle, and tapering towards the summit, compared to the head of a lance.

*cuneate*, when broadest above the middle, and tapering towards the base, compared to a wedge with the point downwards; when very broadly cuneate and rounded at the top, it is often called *flabelliform* or *fan-shaped*.

*spathulate*, when the broad part near the top is short, and the narrow tapering part long, compared to a spatula or flat ladle.

*ovate*, when scarcely twice as long as broad, and rather broader below the middle, compared to the longitudinal section of an egg; *obovate* is the same form, with the broadest part above the middle.

*orbicular*, *oval*, *oblong*, *elliptical*, *rhomboidal*, etc., when compared to the corresponding mathematical figures.

*transversely oblong*, or *oblate*, when conspicuously broader than long.

*falcate*, when curved like the blade of a scythe.

46. Intermediate forms between any two of the above are expressed by combining two terms. Thus, a *linear-lanceolate* leaf is long and narrow, yet broader below the middle, and tapering to a point; a *linear-oblong* one is scarcely narrow enough to be called linear, yet too narrow to be strictly oblong, and does not conspicuously taper either towards the summit or towards the base.

47. The *apex* or *summit* of a leaf is

*acute* or *pointed*, when it forms an acute angle or tapers to a point.

*obtuse* or *blunt*, when it forms a very obtuse angle, or more generally when it is more or less rounded at the top.

*acuminate* or *cuspidate*, when suddenly narrowed at the top, and then more or less prolonged into an *acumen* or *point*, which may be acute or obtuse, linear or tapering. Some botanists make a slight difference between the *acuminate* and *cuspidate* apex, the *acumen* being more distinct from the rest of the leaf in the latter case than in the former; but in general the two terms are used in the same sense, some preferring the one and some the other.

*truncate*, when the end is cut off square.

*retuse*, when very obtuse or truncate, and slightly indented.

*emarginate* or *notched*, when more decidedly indented at the end of the midrib; *obcordate*, if at the same time approaching the shape of a heart with its point downwards.

*mucronate*, when the midrib is produced beyond the apex in the form of a small point.

*aristate*, when the point is fine like a hair.

48. The base of the leaf is liable to the same variations of form as the apex, but the terms more commonly used are *tapering* or *narrowed* for acute and acuminate, *rounded* for obtuse, and *cordate* for emarginate. In all cases the petiole or point of attachment prevent any such absolute termination at the base as at the apex.

49. A leaf may be *cordate* at the base whatever be its length or breadth, or whatever the shape of the two lateral lobes, called *auricles* (or *little ears*), formed by the indenture or notch, but the term *cordiform* or *heart-shaped* leaf is restricted to an ovate and acute leaf, cordate at the base, with rounded auricles. The word *auricles* is more particularly used as applied to sessile and stem-clasping leaves.

50. If the auricles are pointed, the leaf is more particularly called *auriculate*; it is moreover said to be *sagittate*, when the points are directed downwards, compared to an arrow-head; *hastate*, when the points diverge horizontally, compared to a halbert.

51. A *reniform* leaf is broader than long, slightly but broadly cordate at the base, with rounded auricles, compared to a kidney.

52. In a *peltate* leaf, the stalk, instead of proceeding from the lower edge of the blade, is attached to the under surface, usually near the lower edge, but sometimes in the very centre of the blade. The peltate leaf has usually several principal nerves radiating from the point of attachment, being, in fact, a cordate leaf, with the auricles united.

53. All these modifications of division and form in the leaf pass so gradually one into the other that it is often difficult to say which term is the most applicable—whether the leaf be toothed or lobed, divided or compound, oblong or lanceolate, obtuse or acute, etc. The choice of the most apt expression will depend on the skill of the describer.

54. **Leaves**, when **solid**, **Stems**, **Fruits**, **Tubers**, and other parts of plants, when not flattened like ordinary leaves, are

*setaceous* or *capillary*, when very slender like bristles or hairs.

*acicular*, when very slender, but stiff and pointed like needles.

*subulate*, when rather thicker and firmer like awls.

*linear*, when at least four times as long as thick; *oblong*, when from about two to about four times as long as thick, the terms having the same sense as when applied to flat surfaces.

*ovoid*, when egg-shaped, with the broad end downwards, *obovoid* if the broad end is upwards; these terms corresponding to *ovate* and *obovate* shapes in flat surfaces.



*globular* or *spherical*, when corresponding to *orbicular* in a flat surface. *Round* applies to both.

*turbinate*, when shaped like a top.

*conical*, when tapering upwards; *obconical*, when tapering downwards, if in both cases a transverse section shows a circle.

*pyramidal*, when tapering upwards; *obpyramidal*, when tapering downwards, if in both cases a transverse section shows a triangle or polygon.

*fusiform*, or spindle-shaped, when tapering at both ends; *cyindrical*, when not tapering at either end, if in both cases the transverse section shows a circle, or sometimes irrespective of the transverse shape.

*terete*, when the transverse section is not angular; *trigonous*, *triquetrous*, if the transverse section shows a triangle, irrespective in both cases of longitudinal form.

*compressed*, when more or less flattened laterally; *depressed*, when more or less flattened vertically, or at any rate at the top; *obcompressed* (in the achenes of *Compositæ*), when flattened from front to back.

*articulate* or *jointed*, if at any period of their growth (usually when fully formed and approaching their decay, or in the case of fruits when quite ripe) they separate, without tearing, into two or more pieces placed end to end. The joints where they separate are called *articulations*, each separate piece an *article*. The name of *joint* is, in common language, given both to the articulation and the article, but more especially to the former. Some modern botanists, however, propose to restrict it to the article, giving the name of *joining* to the articulation.

*didymous*, when slightly two-lobed, with rounded obtuse lobes.

*moniliform*, or beaded, when much contracted at regular intervals, but not separating spontaneously into articles.

55. In their consistence **Leaves** or other organs are

*fleshy*, when thick and soft; *succulent* is generally used in the same sense, but implies the presence of more juice.

*coriaceous*, when firm and stiff, or very tough, of the consistence of leather.

*crustaceous*, when firm and brittle.

*membranous*, when thin and not stiff.

*scarious* or *scariose*, when very thin, more or less transparent and not green, yet rather stiff.

56. The terms applied botanically to the consistence of solids are those in general use in common language.

57. The mode in which unexpanded leaves are disposed in the leaf-bud is called their *vernation* or *præfoliation*; it varies considerably, and technical terms have been proposed to express some of its varieties, but it has been hitherto rarely noticed in descriptive botany.

## § 6. *Scales, Bracts, and Stipules.*

58. **Scales** (*Squamæ*) are leaves very much reduced in size, usually sessile, seldom green or capable of performing the respiratory functions of leaves. In other words, they are organs resembling leaves in their position on the plant, but differing in size, colour, texture, and functions. They are most frequent on the stock of perennial plants, or at the base of annual branches, especially on the buds of future shoots, when they serve apparently to protect the dormant living germ from the rigour of winter. In the latter case they are usually short, broad, close together, and more or less *imbricated*, that is, overlapping each other like the tiles of a roof. It is this arrangement as well as their usual shape that has suggested the name of *scales*, borrowed from the scales of a fish. Imbricated scales, bracts, or leaves, are said to be *squarrose*, when their tips are pointed and very spreading or recurved.

59. Sometimes, however, most or all the leaves of the plant are reduced to small scales, in which case they do not appear to perform any particular function. The name of *scales* is also given to any small broad scale-like appendages or reduced organs, whether in the flower or any other part of the plant.

60. **Bracts** (*Bractææ*) are the upper leaves of a plant in flower (either all those of the flowering branches, or only one or two immediately under the flower), when differ-



ent from the stem-leaves in size, shape, colour, or arrangement. They are generally much smaller and more sessile. They often partake of the colour of the flower, although they very frequently also retain the green colour of the leaves. When small they are often called *scales*.

61. *Floral leaves* or *leafy bracts* are generally the lower bracts on the upper leaves at the base of the flowering branches, intermediate in size, shape, or arrangement, between the stem-leaves and the upper bracts.

62. *Bracteoles* are the one or two last bracts under each flower, when they differ materially in size, shape, or arrangement from the other bracts.

63. **Stipules** are leaf-like or scale-like appendages at the base of the leaf-stalk, or on the node of the stem. When present there are generally two, one on each side of the leaf, and they sometimes appear to protect the young leaf before it is developed. They are however exceedingly variable in size and appearance, sometimes exactly like the true leaves except that they have no buds in their axils, or looking like the leaflets of a compound leaf, sometimes apparently the only leaves of the plant; generally small and narrow, sometimes reduced to minute scales, spots or scars, sometimes united into one opposite the leaf, or more or less united with, or *adnate* to the petiole, or quite detached from the leaf, and forming a ring or sheath round the stem in the axil of the leaf. In a great number of plants they are entirely wanting.

64. *Stipellæ*, or secondary stipules, are similar organs, sometimes found on compound leaves at the points where the leaflets are inserted.

65. When scales, bracts, or stipules, or almost any part of the plant besides leaves and flowers are stalked, they are said to be *stipitate*, from *stipes*, a *stalk*.

#### § 7. *Inflorescence and its Bracts.*

66. The **Inflorescence** of a plant is the arrangement of the flowering branches, and of the flowers upon them. An *Inflorescence* is a flowering branch, or the flowering summit of a plant above the last stem-leaves, with its branches, bracts, and flowers.

67. A single flower, or an inflorescence, is *terminal* when at the summit of a stem or leafy branch, *axillary* when in the axil of a stem-leaf, *leaf-opposed* when opposite to a stem-leaf. The inflorescence of a plant is said to be *terminal* or *determinate* when the main stem and principal branches end in a flower or inflorescence (not in a leaf-bud), *axillary* or *indeterminate* when all the flowers or inflorescences are axillary, the stem or branches ending in leaf-buds.

68. A *Peduncle* is the stalk of a solitary flower, or of an inflorescence; that is to say, the portion of the flowering branch from the last stem-leaf to the flower, or to the first ramification of the inflorescence, or even up to its last ramifications; but the portion extending from the first to the last ramifications or the axis of inflorescence is often distinguished under the name of *rhachis*.

69. A *Scapæ* or *radical Peduncle* is a leafless peduncle proceeding from the stock, or from near the base of the stem, or apparently from the root itself.

70. A *Pedicel* is the last branch of an inflorescence, supporting a single flower.

71. The branches of inflorescences may be, like those of stems, opposite, alternate, etc. (32, 33), but very often their arrangement is different from that of the leafy branches of the same plant.

72. **Inflorescence** is

*centrifugal*, when the terminal flower opens first, and those on the lateral branches are successively developed.

*centripetal*, when the lowest flowers open first, and the main stem continues to elongate, developing fresh flowers.

73. *Determinate* inflorescence is usually centrifugal. *Indeterminate* inflorescence is always centripetal. Both inflorescences may be combined on one plant, for it often happens that the main branches of an inflorescence are centripetal, whilst the flowers on the lateral branches are centrifugal; or *vice versâ*.

74. An **Inflorescence** is

a *Spike*, or *spicate*, when the flowers are sessile along a simple undivided axis or *rhachis*.

a *Raceme*, or *racemose*, when the flowers are borne on pedicels along a single undivided axis or rhachis.

a *Panicle*, or *paniculate*, when the axis is divided into branches bearing two or more flowers.

a *Head*, or *capitate*, when several sessile or nearly sessile flowers are collected into a compact head-like cluster. The short, flat, convex or conical axis on which the flowers are seated, is called the *receptacle*, a term also used for the torus of a single flower (135). The very compact flower-heads of *Compositæ* are often termed *compound flowers*.

an *Umbel*, or *umbellate*, when several branches or pedicels appear to start from the same point and are nearly of the same length. It differs from the head, like the raceme from the spike, in that the flowers are not sessile. An umbel is said to be *simple*, when each of its branches or *rays* bears a single flower; *compound*, when each ray bears a *partial umbel* or *umbellule*.

a *Corymb*, or *corymbose*, when the branches and pedicels, although starting from different points, all attain the same level, the lower ones being much longer than the upper. It is a flat-topped or *fastigiate* panicle.

a *Cyme*, or *cymose*, when branched and centrifugal. It is a centrifugal panicle, and is often corymbose. The central flower opens first. The lateral branches successively developed are usually forked or opposite (dichotomous or trichotomous), but sometimes after the first forking the branches are no longer divided, but produce a succession of pedicels on their upper side forming apparently unilateral centripetal racemes; whereas if attentively examined, it will be found that each pedicel is at first terminal, but becomes lateral by the development of one outer branch only, immediately under the pedicel. Such branches, when in bud, are generally rolled back at the top, like the tail of a scorpion, and are thence called *scorpioid*.

a *Thyrus*, or *thyrsoïd*, when cymes, usually opposite, are arranged in a narrow pyramidal panicle.

75. There are numerous cases where inflorescences are intermediate between some two of the above, and are called by different botanists by one or the other name, according as they are guided by apparent or by theoretical similarity. A spike-like panicle, where the axis is divided into very short branches forming a cylindrical compact inflorescence, is called sometimes a spike, sometimes a panicle. If the flowers are in distinct clusters along a simple axis, the inflorescence is described as an *interrupted spike* or *raceme*, according as the flowers are nearly sessile or distinctly pedicellate; although when closely examined the flowers will be found to be inserted not on the main axis, but on a very short branch, thus, strictly speaking, constituting a panicle.

76. The *catkins* (*amenta*) of *Amentaceæ*, the *spadices* of several Monocotyledons, the *ears* and *spikelets* of Grasses are forms of the spike.

77. **Bracts** are generally placed singly under each branch of the inflorescence, and under each pedicel; bracteoles are usually two, one on each side, on the pedicel or close under the flower, or even upon the calyx itself; but bracts are also frequently scattered along the branches without axillary pedicels; and when the differences between the bracts and bracteoles are trifling or immaterial, they are usually all called bracts.

78. When three bracts appear to proceed from the same point, they will, on examination, be found to be really either one bract and two stipules, or one bract with two bracteoles in its axil. When two bracts appear to proceed from the same point, they will usually be found to be the stipules of an undeveloped bract, unless the branches of the inflorescence are opposite, when the bracts will of course be opposite also.

79. When several bracts are collected in a whorl, or are so close together as to appear whorled, or are closely imbricated round the base of a head or umbel, they are collectively called an *Involucre*. The bracts composing an involucre are described under the names of *leaves*, *leaflets*, *bracts*, or *scales*, according to their appearance. *Phyllaries* is a useless term, lately introduced for the bracts or scales of the involucre of *Compositæ*. An *Involucel* is the involucre of a partial umbel.

80. When several very small bracts are placed round the base of a calyx or of an

involucre, they have been termed a *calycule*, and the calyx or involucre said to be *calyculate*, but these terms are now falling into disuse, as conveying a false impression.

81. A *Spatha* is a bract or floral leaf enclosing the inflorescence of some Monocotyledons.

82. *Paleæ*, *Pales*, or *Chaff*, are the inner bracts or scales in *Compositæ*, *Gramineæ*, and some other plants, when of a thin yet stiff consistence, usually narrow and of a pale colour.

83. *Glumes* are the bracts enclosing the flowers of *Cyperaceæ* and *Gramineæ*.

#### § 8. The Flower in General:

84. A *complete Flower* (15) is one in which the calyx, corolla, stamens, and pistils are all present; a *perfect* flower, one in which all these organs, or such of them as are present, are capable of performing their several functions. Therefore, properly speaking, an *incomplete* flower is one in which any one or more of these organs is wanting; and an *imperfect* flower, one in which any one or more of these organs is so altered as to be incapable of properly performing its functions. These imperfect organs are said to be *abortive* if much reduced in size or efficiency; *rudimentary* if so much so as to be scarcely perceptible. But, in many works, the term *incomplete* is specially applied to those flowers in which the perianth is simple or wanting, and *imperfect* to those in which either the stamens or pistil are imperfect or wanting.

85. A *Flower* is

*dichlamydeous*, when the perianth is double, both calyx and corolla being present and distinct.

*monochlamydeous*, when the perianth is single, whether by the union of the calyx and corolla, or the deficiency of either.

*asepalous*, when there is no calyx.

*apetalous*, when there is no corolla.

*naked*, when there is no perianth at all.

*hermaphrodite* or *bisexual*, when both stamens and pistil are present and perfect.

*male* or *staminate*, when there are one or more stamens, but either no pistil at all or an imperfect one.

*female* or *pistillate*, when there is a pistil, but either no stamens at all, or only imperfect ones.

*neuter*, when both stamens and pistil are imperfect or wanting.

*barren* or *sterile*, when from any cause it produces no seed.

*fertile*, when it does produce seed. In some works the terms *barren*, *fertile*, and *perfect* are also used respectively as synonyms of *male*, *female*, and *hermaphrodite*.

86. The flowers of a plant or species are said collectively to be *unisexual* or *diclinous* when the flowers are all either male or female.

*monœcious*, when the male and female flowers are distinct; but on the same plant.

*diœcious*, when the male and female flowers are on distinct plants.

*polygamous*, when there are male, female, and hermaphrodite flowers on the same or on distinct plants.

87. A head of flowers is *heterogamous* when male, female, hermaphrodite, and neuter flowers, or any two or three, of them, are included in one head; *homogamous*, when all the flowers included in one head are alike in this respect. A spike or head of flowers is *androgynous* when male and female flowers are mixed in it. These terms are only used in the case of very few Natural Orders.

88. As the scales of buds are leaves undeveloped or reduced in size and altered in shape and consistence, and bracts are leaves likewise reduced in size, and occasionally altered in colour; so the parts of the flower are considered as leaves still further altered in shape, colour, and arrangement round the axis, and often more or less combined with each other. The details of this theory constitute the comparatively modern branch of botany called *Vegetable Metamorphosis*, or *Homology*, sometimes improperly termed *Morphology* (8).

89. To understand the arrangement of the floral parts, let us take a *complete* flower, in which moreover all the parts are *free* from each other, *definite* in number, *i. e.* always the same in the same species, and *symmetrical* or *isomerous*, *i. e.* when each whorl consists of the same number of parts.



90. Such a complete symmetrical flower consists usually of either four or five whorls of altered leaves (88), placed immediately one within the other.

The **Calyx** forms the outer whorl. Its parts are called *sepals*.

The **Corolla** forms the next whorl. Its parts, called *petals*, usually *alternate* with the sepals; that is to say, the centre of each petal is immediately over or within the interval between two sepals.

The **Stamens** form one or two whorls within the petals. If two, those of the outer whorl (the *outer stamens*) alternate with the petals, and are consequently opposite to, or over the centre of the sepals; those of the inner whorl (the *inner stamens*) alternate with the outer ones, and are therefore opposite to the petals. If there is only one whorl of stamens, they most frequently alternate with the petals; but sometimes they are opposite the petals and alternate with the sepals.

The **Pistil** forms the inner whorl; its carpels usually alternate with the inner row of stamens.

91. In an axillary or lateral flower the *upper* parts of each whorl (sepals, petals, stamens, or carpels) are those which are next to the main axis of the stems or branch, the *lower* parts those which are furthest from it; the intermediate ones are said to be *lateral*. The words *anterior* (front) and *posterior* (back) are often used for lower and upper respectively, but their meaning is sometimes reversed if the writer supposes himself in the centre of the flower instead of outside of it.

92. The number of parts in each whorl of a flower is expressed adjectively by the following numerals derived from the Greek :—

mono-	di-	tri-	tetra-	penta-	hexa-	hepta-	octo-	ennea-	deca-	etc.,	poly-
1-	2-	3-	4-	5-	6-	7-	8-	9-	10-		many-

prefixed to a termination indicating the whorl referred to.

93. Thus, a **Flower** is

*disepalous*, *triseepalous*, *tetraseepalous*, *polyseepalous*, etc., according as there are 2, 3, 4, or many (or an indefinite number of) sepals.

*dipetalous*, *tripetalous*, *polypetalous*, etc., according as there are 2, 3, or many petals.

*diandrous*, *triandrous*, *polyandrous*, etc., according as there are 2, 3, or many stamens.

*digynous*, *trigynous*, *polygynous*, etc., according as there are 2, 3, or many carpels.

And generally (if symmetrical), *dimerous*, *trimerous*, *polymerous*, etc., according as there are 2, 3, or many (or an indefinite number of) parts to each whorl.

94. Flowers are *unsymmetrical* or *anisomerous*, strictly speaking, when any one of the whorls has a different number of parts from any other; but when the pistils alone are reduced in number, the flower is still frequently called symmetrical or isomerous, if the calyx, corolla, and staminal whorls have all the same number of parts.

95. Flowers are *irregular* when the parts of any one of the whorls are unequal in size, dissimilar in shape, or do not spread regularly round the axis at equal distances. It is however more especially irregularity of the corolla that is referred to in descriptions. A slight inequality in size or direction in the other whorls does not prevent the flower being classed as *regular*, if the corolla or perianth is conspicuous and regular.

#### § 9. The Calyx and Corolla, or Perianth.

96. The **Calyx** (90) is usually green, and smaller than the corolla; sometimes very minute, rudimentary, or wanting, sometimes very indistinctly whorled, or not whorled at all, or in two whorls, or composed of a large number of sepals, of which the outer ones pass gradually into bracts, and the inner ones into petals.

97. The **Corolla** (90) is usually coloured, and of a more delicate texture than the calyx, and, in popular language, is often more specially meant by the *flower*. Its petals are more rarely in two whorls, or indefinite in number, and the whorl more rarely broken than in the case of the calyx, at least when the plant is in a natural state. *Double flowers* are in most cases an accidental deformity or monster in which the ordinary number of petals is multiplied by the conversion of stamens, sepals, or even carpels into petals, by the division of ordinary petals, or simply by the addition of supernumerary ones. Petals are also sometimes very small, rudimentary, or entirely deficient.

98. In very many cases, a so-called *simple perianth* (15) (of which the parts are usually called *leaves* or *segments*) is one in which the sepals and petals are similar in form and texture, and present apparently a single whorl. But if examined in the young bud, one half of the parts will generally be found to be placed outside the other half, and there will frequently be some slight difference in texture, size, and colour, indicating to the close observer the presence of both calyx and corolla. Hence much discrepancy in descriptive works. Where one botanist describes a simple perianth of six segments, another will speak of a double perianth of three sepals and three petals.

99. The following terms and prefixes, expressive of the modifications of form and arrangement of the corolla and its petals, are equally applicable to the calyx and its sepals, and to the simple perianth and its segments.

100. The Corolla is said to be *monopetalous* when the petals are united, either entirely or at the base only, into a cup, tube, or ring; *polypetalous* when they are all free from the base. These expressions, established by a long usage, are not strictly correct, for *monopetalous* (consisting of a single petal) should apply rather to a corolla really reduced to a single petal, which would then be on one side of the axis; and *polypetalous* is sometimes used more appropriately for a corolla with an indefinite number of petals. Some modern botanists have therefore proposed the term *gamopetalous* for the corolla with united petals, and *dialypetalous* for that with free petals; but the old-established expressions are still the most generally used.

101. When the petals are partially united, the lower entire portion of the corolla is called the *tube*, whatever be its shape, and the free portions of the petals are called the *teeth*, *lobes*, or *segments* (39), according as they are short or long in proportion to the whole length of the corolla. When the tube is excessively short, the petals appear at first sight free, but their slight union at the base must be carefully attended to, being of importance in classification.

102. The **Æstivation** of a corolla, is the arrangement of the petals, or of such portion of them as is free, in the unexpanded bud. It is

*valvate*, when they are strictly whorled in their whole length, their edges being placed against each other without overlapping. If the edges are much inflexed, the æstivation is at the same time *induplicate*; *involute*, if the margins are rolled inward; *reduplicate*, if the margins project outwards into salient angles; *revolute*, if the margins are rolled outwards; *plicate*, if the petals are folded in longitudinal plaits.

*imbricate*, when the whorl is more or less broken by some of the petals being outside the others, or by their overlapping each other at least at the top. Five-petaled imbricate corollas are *quincuncially* imbricate when one petal is outside, and an adjoining one wholly inside, the three others intermediate and overlapping on one side; *bilabiate*, when two adjoining ones are inside or outside the three others. Imbricate petals are described as *crumpled* (*corrugate*) when puckered irregularly in the bud.

*twisted*, *contorted*, or *convolute*, when each petal overlaps an adjoining one on one side, and is overlapped by the other adjoining one on the other side. Some botanists include the twisted æstivation in the general term *imbricate*; others carefully distinguish the one from the other.

103. In a few cases the overlapping is so slight that the three æstivations cannot easily be distinguished one from the other; in a few others the æstivation is variable, even in the same species, but, in general, it supplies a constant character in species, in genera, or even in Natural Orders.

104. In general shape the **Corolla** is

*tubular*, when the whole or the greater part of it is in the form of a tube or cylinder.

*campanulate*, when approaching in some measure the shape of a cup or bell.

*urceolate*, when the tube is swollen or nearly globular, contracted at the top, and slightly expanded again in a narrow rim.

*rotate* or *stellate*, when the petals or lobes are spread out horizontally from the base, or nearly so, like a wheel or star.

*hypocrateriform* or *salver-shaped*, when the lower part is cylindrical and the upper portion expanded horizontally. In this case the name of *tube* is restricted to the cylindrical part, and the horizontal portion is called the *limb*, whether it be divided to the base or not. The orifice of the tube is called its *mouth* or *throat*.

*infundibuliform* or *funnel-shaped*, when the tube is cylindrical at the base, but enlarged at the top into a more or less campanulate limb, of which the lobes often spread horizontally. In this case the campanulate part, up to the commencement of the lobes, is sometimes considered as a portion of the tube, sometimes as a portion of the limb, and by some botanists again described as independent of either, under the name of *throat* (*fauces*). Generally speaking, however, in campanulate, infundibuliform, or other corollas, where the lower entire part passes gradually into the upper divided and more spreading part, the distinction between the *tube* and the *limb* is drawn either at the point where the lobes separate, or at the part where the corolla first expands, according to which is the most marked.

105. Irregular corollas have received various names according to the more familiar forms they have been compared to. Some of the most important are the

*bilabiate* or *two-lipped* corolla, when, in a four- or five-lobed corolla, the two or three upper lobes stand obviously apart, like an *upper lip*, from the two or three lower ones or *underlip*. In *Orchideæ* and some other families the name of lip, or *labellum*, is given to one of the divisions or lobes of the perianth.

*personate*, when two-lipped, and the orifice of the tube closed by a projection from the base of the upper or lower lip, called a *palate*.

*ringent*, when very strongly two-lipped, and the orifice of the tube very open.

*spurred*, when the tube or the lower part of the petal has a conical hollow projection, compared to the spur of a cock; *saccate*, when the spur is short and round like a little bag; *gibbous*, when projecting at any part into a slight swelling; *foveolate*, when marked in any part with a slight glandular or thickened cavity.

*resupinate* or *reversed*, when a lip, spur, etc., which in allied species is usually lowest, lies uppermost, and *vice versâ*.

106. The above terms are mostly applied to the forms of monopetalous corollas, but several are also applicable to those of polypetalous ones. Terms descriptive of the special forms of corolla in certain Natural Orders, will be explained under those Orders respectively.

107. Most of the terms used for describing the forms of leaves (39, 45) are also applicable to those of individual petals; but the flat expanded portion of a petal, corresponding to the blade of the leaf, is called its *lamina*, and the stalk, corresponding to the petiole, its *claw* (*unguis*). The stalked petal is said to be *unguiculate*.

## § 10. The Stamens.

108. Although in a few cases the outer stamens may gradually pass into petals, yet, in general, **Stamens** are very different in shape and aspect from leaves, sepals, or petals. It is only in a theoretical point of view (not the less important in the study of the physiological economy of the plant) that they can be called altered leaves.

109. This usual form is a stalk, called the *filament*, bearing at the top an *anther* divided into two pouches or *cells*. These anther-cells are filled with *pollen*, consisting of minute grains, usually forming a yellow dust, which, when the flower expands, is scattered from an opening in each cell. When the two cells are not closely contiguous, the portion of the anther that unites them is called the *connectivum*.

110. The filament is often wanting, and the anther sessile, yet still the stamen is perfect; but if the anther, which is the essential part of the stamen, is wanting, or does not contain pollen, the stamen is imperfect, and is then said to be *barren* or *sterile* (without pollen), *abortive*, or *rudimentary* (84), according to the degree to which the imperfection is carried. Imperfect stamens are often called *staminodia*.

111. In unsymmetrical flowers, the stamens of each whorl are sometimes reduced in number below that of the petals, even to a single one, and in several Natural Orders they are multiplied indefinitely.

112. The terms *monandrous* and *polyandrous* are restricted to flowers which have really but one stamen, or an indefinite number respectively. Where several stamens are united into one, the flower is said to be *synandrous*.

113. **Stamens** are

*monadelphous*, when united by their filaments into one cluster. This cluster either



forms a tube round the pistil, or, if the pistil is wanting, occupies the centre of the flower.

*diadelphous*, when so united into two clusters. The term is more especially applied to certain *Leguminosæ*, in which nine stamens are united in a tube slit open on the upper side, and a tenth, placed in the slit, is free. In some other plants the stamens are equally distributed in the two clusters.

*triadelphous*, *pentadelphous*, *polyadelphous*, when so united into three, five, or many clusters.

*syngenesious*, when united by their anthers in a ring round the pistil, the filaments usually remaining free.

*didynamous*, when (usually in a bilabiate flower) there are four stamens in two pairs, those of one pair longer than those of the other.

*tetradynamous*, when (in *Cruciferae*) there are six, four of them longer than the two others.

*exserted*, when longer than the corolla, or even when longer than its tube, if the limb be very spreading.

114. An **Anther** (109) is

*adnate*, when continuous with the filament, the anther-cells appearing to lie their whole length along the upper part of the filament.

*innate*, when firmly attached by their base to the filament. This is like an adnate anther, but rather more distinct from the filament.

*versatile*, when attached by their back to the very point of the filament, so as to swing loosely.

115. Anther-cells may be *parallel* or *diverging* at a less or greater angle; or *divaricate*, when placed end to end so as to form one straight line. The end of each anther-cell placed nearest to the other cell is generally called its *apex* or *summit*, and the other end its *base* (36); but some botanists reverse the sense of these terms.

116. Anthers have often, on their connectivum or cells, appendages termed *bristles* (*setæ*), *spurs*, *crests*, *points*, *glands*, etc., according to their appearance.

117. Anthers have occasionally only one cell: this may take place either by the disappearance of the partition between two closely contiguous cells, when these cells are said to be *confuent*; or by the abortion or total deficiency of one of the cells, when the anther is said to be *dimidiate*.

118. Anthers will open or *dehisce* to let out the pollen, like capsules, in *valves*, *pores*, or *slits*. Their dehiscence is *introrse*, when the opening faces the pistil; *extrorse*, when towards the circumference of the flower.

119. Pollen (109) is not always in the form of dust. It is sometimes collected in each cell into one or two little wax-like masses. Special terms used in describing these masses or other modifications of the pollen will be explained under the Orders where they occur.

### § 11. The Pistil.

120. The carpels (91) of the **Pistil**, although they may occasionally assume, rather more than stamens, the appearance and colour of leaves, are still more different in shape and structure. They are usually sessile; if stalked, their stalk is called a *pedo-carp*. This stalk, upon which each separate carpel is supported above the receptacle, must not be confounded with the *gynobasis* (143), upon which the whole pistil is sometimes raised.

121. Each carpel consists of three parts:

1. The **Ovary**, or enlarged base, which includes one or more cavities or *cells*, containing one or more small bodies called *ovules*. These are the earliest condition of the future seeds.

2. the **Style**, proceeding from the summit of the ovary, and supporting—

3. the **Stigma**, which is sometimes a point (or *punctiform stigma*) or small head (a *capitate stigma*) at the top of the style or ovary, sometimes a portion of its surface more or less lateral and variously shaped, distinguished by a looser texture, and covered with minute protuberances called *papillæ*.

122. The style is often wanting, and the stigma is then sessile on the ovary, but in



the perfect pistil there is always at least one ovule in the ovary, and some portion of stigmatic surface. Without these the pistil is imperfect, and said to be *barren* (not setting seed), *abortive*, or *rudimentary* (84), according to the degree of imperfection.

123. The ovary being the essential part of the pistil, most of the terms relating to the number, arrangement, etc., of the carpels, apply specially to their ovaries. In some works each separate carpel is called a pistil, all those of a flower constituting together the *gynæcium*; but this term is in little use, and the word *pistil* is more generally applied in a collective sense. When the ovaries are at all united, they are commonly termed collectively a compound ovary.

124. The number of carpels or ovaries in a flower is frequently reduced below that of the parts of the other floral whorls, even in flowers otherwise symmetrical. In a very few genera, however, the ovaries are more numerous than the petals, or indefinite. They are in that case either arranged in a single whorl, or form a head or spike in the centre of the flower.

125. The terms *monogynous*, *digynous*, *polygynous*, etc. (with a pistil of one, two, or more parts), are vaguely used, applying sometimes to the whole pistil, sometimes to the ovaries alone, or to the styles or stigmas only. Where a more precise nomenclature is adopted, the flower is

*monocarpellary*, when the pistil consists of a single simple carpel.

*bi-, tri-, etc.*, to *poly-carpellary*, when the pistil consists of two, three, or an indefinite number of carpels, whether separate or united.

*syncarpous*, when the carpels or their ovaries are more or less united into one compound ovary.

*apocarpous*, when the carpels or ovaries are all free and distinct.

126. A compound ovary is

*unilocular* or *one-celled*, when there are no partitions between the ovules, or when these partitions do not meet in the centre so as to divide the cavity into several cells.

*plurilocular* or *several-celled*, when completely divided into two or more cells by partitions called *dissepiments* (*septa*), usually vertical and radiating from the centre or axis of the ovary to its circumference.

*bi-, tri-, etc.*, to *multi-locular*, according to the number of these cells, two, three, etc., or many.

127. In general the number of cells or of dissepiments, complete or partial, or of rows of ovules, corresponds with that of the carpels, of which the pistil is composed. But sometimes each carpel is divided completely or partially into two cells, or has two rows of ovules, so that the number of carpels appears double what it really is. Sometimes again the carpels are so completely combined and reduced as to form a single cell, with a single ovule, although it really consist of several carpels. But in these cases the ovary is usually described as it appears, as well as such as it is theoretically supposed to be.

128. In apocarpous pistils the styles are usually free, each bearing its own stigma. Very rarely the greater part of the styles, or the stigmas alone, are united, whilst the ovaries remain distinct.

129. Syncarpous flowers are said to have

*several styles*, when the styles are free from the base.

*one style, with several branches*, when the styles are connected at the base, but separate below the point where the stigmas or stigmatic surfaces commence.

*one simple style, with several stigmas*, when united up to the point where the stigmas or stigmatic surfaces commence, and then separating.

*one simple style, with a branched, lobed, toothed, notched, or entire stigma* (as the case may be), when the stigmas also are more or less united. In many works, however, this precise nomenclature is not strictly adhered to, and considerable confusion is often the result.

130. In general the number of styles, or branches of the style or stigma, is the same as that of the carpels, but sometimes that number is doubled, especially in the stigmas, and sometimes the stigmas are dichotomously or pinnately branched, or *penicillate*, that is, divided into a tuft of hair-like branches. All these variations sometimes make it a difficult task to determine the number of carpels forming a compound ovary, but the point is of considerable importance in fixing the affinities of plants, and, by careful

consideration, the real as well as the apparent number has now in most cases been agreed upon.

131. The *Placenta* is the part of the inside of the ovary to which the ovules are attached, sometimes a mere point or line on the inner surface, often more or less thickened or raised. *Placentation* is therefore the indication of the part of the ovary to which the ovules are attached.

132. Placentas are

*axile*, when the ovules are attached to the axis or centre, that is, in plurilocular ovaries, when they are attached to the inner angle of each cell; in unilocular simple ovaries, which have almost always an excentric style or stigma, when the ovules are attached to the side of the ovary nearest to the style; in unilocular compound ovaries, when the ovules are attached to a central protuberance, column, or axis rising up from the base of the cavity. If this column does not reach the top of the cavity, the placenta is said to be *free* and *central*.

*parietal*, when the ovules are attached to the inner surface of the cavity of a one-celled compound ovary. Parietal placentas are usually slightly thickened or raised lines, sometimes broad surfaces nearly covering the inner surface of the cavity, sometimes projecting far into the cavity, and constituting partial dissepiments, or even meeting in the centre, but without cohering there. In the latter case the distinction between the one-celled and the several-celled ovary sometimes almost disappears.

133. Each **Ovule** (121), when fully formed, usually consists of a central mass or *nucleus* enclosed in two bag-like coats, the outer one called *primine*, the inner one *secundine*. The *chalaza* is the point of the ovule at which the base of the nucleus is confluent with the coats. The *foramen* is a minute aperture in the coats over the *apex* of the nucleus.

134. **Ovules** are

*orthotropous* or *straight*, when the chalaza coincides with the base (36) of the ovule, and the foramen is at the opposite extremity, the axis of the ovule being straight.

*campylotropous* or *incurved*, when the chalaza still coinciding with the base of the ovule, the axis of the ovule is curved, bringing the foramen down more or less towards that base.

*anatropous* or *inverted*, when the chalaza is at the apex of the ovule, and the foramen next to its base, the axis remaining straight. In this, one of the most frequent forms of the ovule, the chalaza is connected with the base by a cord, called the *raphe*, adhering to one side of the ovule, and becoming more or less incorporated with its coats, as the ovule enlarges into a seed.

*amphitropous* or *half-inverted*, when the ovule being as it were attached laterally, the chalaza and foramen at opposite ends of its straight or curved axis are about equally distant from the base or point of attachment.

## § 12. The Receptacle and Relative Attachment of the Floral Whorls.

135. The **Receptacle** or *torus* is the extremity of the peduncle (above the calyx), upon which the corolla, stamens, and ovary are inserted. It is sometimes little more than a mere point or minute hemisphere, but it is often also more or less elongated, thickened, or otherwise enlarged. It must not be confounded with the receptacle of inflorescence (74).

136. A *Disk*, or *disc*, is a circular enlargement of the receptacle, usually in the form of a cup (*cupular*), of a flat disk or quoit, or of a cushion (*pulvinate*). It is either immediately at the base of the ovary within the stamens, or between the petals and stamens, or bears the petals or stamens or both on its margin, or is quite at the extremity of the receptacle, with the ovaries arranged in a ring round it or under it.

137. The disk may be *entire*, or *toothed*, or *lobed*, or *divided* into a number of parts, usually equal to or twice that of the stamens or carpels. When the parts of the disk are quite separate and short, they are often called glands.

138. *Nectaries*, are either the disk, or small deformed petals, or abortive stamens, or appendages at the base of petals or stamens, or any small bodies within the flower which do not look like petals, stamens, or ovaries. They were formerly supposed to

supply bees with their honey, and the term is frequently to be met with in the older Floras, but is now deservedly going out of use.

139. When the disk bears the petals and stamens, it is frequently adherent to, and apparently forms part of, the tube of the calyx, or it is adherent to, and apparently forms part of, the ovary, or of both calyx-tube and ovary. Hence the three following important distinctions in the relative insertion of the floral whorls.

140. Petals, or as it is frequently expressed, flowers, are

*hypogynous* (i. e. under the ovary), when they or the disk that bears them are entirely free both from the calyx and ovary. The ovary is then described as *free* or *superior*, the calyx as *free* or *inferior*, the petals as being *inserted on the receptacle*.

*perigynous* (i. e. round the ovary), when the disk bearing the petals is quite free from the ovary, but is more or less combined with the base of the calyx-tube. The ovary is then still described as *free* or *superior*, even though the combined disk and calyx-tube may form a deep cup with the ovary lying in the bottom; the calyx is said to be *free* or *inferior*, and the petals are described as *inserted on the calyx*.

*epigynous* (i. e. upon the ovary), when the disk bearing the petals is combined both with the base of the calyx-tube and the base outside of the ovary; either closing over the ovary so as only to leave a passage for the style, or leaving more or less of the top of the ovary free, but always adhering to it above the level of the insertion of the lowest ovule (except in a very few cases where the ovules are absolutely suspended from the top of the cell). In epigynous flowers the ovary is described as *adherent* or *inferior*, the calyx as *adherent* or *superior*, the petals as *inserted on* or *above the ovary*. In some works, however, most epigynous flowers are included in the perigynous ones, and a very different meaning is given to the term *epigynous* (144), and there are a few cases where no positive distinction can be drawn between the epigynous and perigynous flowers, or again between the perigynous and hypogynous flowers.

141. When there are no petals, it is the insertion of the stamens that determines the difference between the hypogynous, perigynous, and epigynous flowers.

142. When there are both petals and stamens,

in hypogynous flowers, the petals and stamens are usually free from each other, but sometimes they are combined at the base. In that case, if the petals are distinct from each other, and the stamens are monadelphous, the petals are often said to be *inserted on* or *combined with the staminal tube*; if the corolla is gamopetalous and the stamens distinct from each other, the latter are said to be *inserted in the tube of the corolla*.

in perigynous flowers, the stamens are usually inserted immediately within the petals, or alternating with them on the edge of the disk, but occasionally much lower down within the disk, or even on the unenlarged part of the receptacle.

in epigynous flowers, when the petals are distinct, the stamens are usually inserted as in perigynous flowers; when the corolla is gamopetalous, the petals are either free and hypogynous, or combined at the base with (inserted in) the tube of the corolla.

143. When the receptacle is distinctly elongated below the ovary, it is often called a *gynobasis*, *gynophore*, or *stalk of the ovary*. If the elongation takes place below the stamens or below the petals, these stamens or petals are then said to be *inserted on the stalk of the ovary*, and are occasionally, but falsely, described as *epigynous*. Really epigynous stamens (i. e. when the filaments are combined with the ovary) are very rare, unless the rest of the flower is epigynous.

144. An *epigynous disk* is a name given either to the thickened summit of the ovary in epigynous flowers, or very rarely to a real disk or enlargement of the receptacle closing over the ovary.

145. In the relative position of any two or more parts of the flower, whether in the same or in different whorls, they are

*connivent*, when nearer together at the summit than at the base.

*divergent*, when further apart at the summit than at the base.

*coherent*, when united together, but so slightly that they can be separated with little or no laceration; and one of the two cohering parts (usually the smallest or least important) is said to be *adherent* to the other. Grammatically speaking, these two terms convey nearly the same meaning, but require a different form of phrase; prac-



tically however it has been found more convenient to restrict *cohesion* to the union of parts of the same whorl, and *adhesion* to the union of parts of different whorls.

*connate*, when so closely united that they cannot be separated without laceration. Each of the two connate parts, and especially that one which is considered the smaller or of the least importance, is said to be *adnate* to the other.

*free*, when neither coherent nor connate.

*distinct* is also used in the same sense, but is also applied to parts distinctly visible or distinctly limited.

### § 13. *The Fruit.*

146. The **Fruit** (15) consists of the ovary and whatever other parts of the flower are *persistent* (*i. e.* persist at the time the seed is ripe), usually enlarged, and more or less altered in shape and consistence. It encloses or covers the seed or seeds till the period of maturity, when it either opens for the seed to escape, or falls to the ground with the seed. When stalked, its stalk has been termed a *carpopophore*.

147. Fruits are, in elementary works, said to be *simple* when the result of a single flower, *compound* when they proceed from several flowers closely packed or combined in a head. But as a fruit resulting from a single flower, with several distinct carpels, is compound in the sense in which that term is applied to the ovary, the terms *single* and *aggregate*, proposed for the fruit resulting from one or several flowers, may be more appropriately adopted. In descriptive botany a fruit is always supposed to result from a single flower unless the contrary be stated. It may, like the pistil, be syncarpous or apocarpous (125); and as in many cases carpels united in the flower may become separate as they ripen, an apocarpous fruit may result from a syncarpous pistil.

148. The involucre or bracts often persist and form part of aggregate fruits, but very seldom so in single ones.

149. The receptacle becomes occasionally enlarged and succulent; if when ripe it falls off with the fruit, it is considered as forming part of it.

150. The adherent part of the calyx of epigynous flowers always persists and forms part of the fruit; the free part of the calyx of epigynous flowers or the calyx of perigynous flowers, either persists entirely at the top of or round the fruit, or the lobes alone fall off, or the lobes fall off with whatever part of the calyx is above the insertion of the petals, or the whole of what is free from the ovary falls off, including the disk bearing the petals. The calyx of hypogynous flowers usually falls off entirely or persists entirely. In general a calyx is called *deciduous* if any part falls off. When it persists it is either enlarged round or under the fruit, or it withers and dries up.

151. The corolla usually falls off entirely; when it persists it is usually withered and dry (*marcescent*), or very seldom enlarges round the fruit.

152. The stamens either fall off, or more or less of their filaments persists, usually withered and dry.

153. The style sometimes falls off or dries up and disappears; sometimes persists, forming a point to the fruit, or becomes enlarged into a wing or other appendage to the fruit.

154. The *Pericarp* is the portion of the fruit formed of the ovary, and whatever adheres to it exclusive of and outside of the seed or seeds, exclusive also of the persistent receptacle, or of whatever portion of the calyx persists round the ovary without adhering to it.

155. Fruits have often external appendages called *wings* (alæ), *beaks*, *crests*, *awns*, etc., according to their appearance. They are either formed by persistent parts of the flower more or less altered, or grow out of the ovary or the persistent part of the calyx. If the appendage be a ring of hairs or scales round the top of the fruit, it is called a *pappus*.

156. Fruits are generally divided into *succulent* (including *fleshy*, *pulpy*, and *juicy* fruits) and *dry*. They are *dehiscent* when they open at maturity to let out the seeds, *indehiscent* when they do not open spontaneously but fall off with the seeds. Succulent fruits are usually indehiscent.

157. The principal kinds of succulent fruits are

the *Berry*, in which the whole substance of the pericarp is fleshy or pulpy, with

the exception of the outer skin or rind, called the *Epicarp*. The seeds themselves are usually immersed in the pulp; but in some berries, the seeds are separated from the pulp by the walls of the cavity or cells of the ovary, which forms as it were a thin inner skin or rind, called the *Endocarp*.

the *Drupe*, in which the pericarp, when ripe, consists of two distinct portions, an outer succulent one called the *Sarcocarp* (covered like the berry by a skin or epicarp), and an inner dry endocarp called the *Putamen*, which is either *cartilaginous* (of the consistence of parchment) or hard and woody. In the latter case it is commonly called a *stone*, and the drupe a *stone-fruit*. When the putamen consists of several distinct stones or nuts, each enclosing a seed, they are called *pyrenes*, or sometimes *kernels*.

158. The principal kinds of dry fruits are

the *Capsule* or *Pod*,\* which is dehiscent. When ripe the pericarp usually splits longitudinally into as many or twice as many pieces, called *valves*, as it contains cells or placentas. If these valves separate at the line of junction of the carpels, that is, along the line of the placentas or dissepiments, either splitting them or leaving them attached to the axis, the dehiscence is termed *septicidal*; if the valves separate between the placentas or dissepiment, the dehiscence is *loculicidal*, and the valves either bear the placentas or dissepiments along their middle line, or leave them attached to the axis. Sometimes also the capsule discharges its seeds by *slits*, *chinks*, or *pores*, more or less regularly arranged, or bursts irregularly, or separates into two parts by a horizontal line; in the latter case it is said to be *circumsciss*.

the *Nut* or *Achene*, which is indehiscent and contains but a single seed. When the pericarp is thin in proportion to the seed it encloses, the whole fruit (or each of its lobes) has the appearance of a single seed, and is so called in popular language. If the pericarp is thin and rather loose, it is often called an *Utricle*. A *Samara* is a nut with a wing at its upper end.

159. Where the carpels of the pistil are distinct (125) they may severally become as many distinct berries, drupes, capsules, or achenes. Separate carpels are usually more or less compressed laterally, with more or less prominent inner and outer edges, called *sutures*, and, if dehiscent, the carpel usually opens at these sutures. A *Follicle* is a carpel opening at the inner suture only. In some cases where the carpels are united in the pistil they will separate when ripe; they are then called *Cocci* if one-seeded.

160. The peculiar fruits of some of the large Orders have received special names, which will be explained under each Order. Such are the *siliqua* and *silicula* of Cruciferae, the *legume* of Leguminosae, the *pome* of *Pyrus* and its allies, the *pepo* of Cucurbitaceae, the *cone* of Coniferae, the *grain* or *caryopsis* of Gramineae, etc.

#### § 14. The Seed.

161. The **Seed** is enclosed in the pericarp in the great majority of flowering plants, called therefore *Angiosperms*, or *angiospermous plants*. In *Coniferae* and a very few allied genera, called *Gymnosperms*, or *gymnospermous plants*, the seed is naked, without any real pericarp. These truly gymnospermous plants must not be confounded with *Labiatae*, *Boragineae*, etc., which have also been falsely called gymnospermous, their small nuts having the appearance of seeds (158).

162. The seed when ripe contains an *embryo* or young plant, either filling or nearly filling the cavity, but not attached to the outer skin or the seed, or more or less immersed in a mealy, oily, fleshy, or horn-like substance, called the *albumen*, or *perisperm*. The presence or absence of this albumen, that is, the distinction between *albuminous* and *exalbuminous* seeds, is one of great importance. The embryo or albumen can often only be found or distinguished when the seed is quite ripe, or sometimes only when it begins to germinate.

163. The shell of the seed consists usually of two separable *coats*. The outer coat, called the *testa*, is usually the principal one, and in most cases the only one attended to in descriptions. It may be hard and *crustaceous*, woody or bony, or thin and *mem-*

\* In English descriptions, *pod* is more frequently used when it is long and narrow; *capsule*, or sometimes *pouch*, when it is short and thick or broad.

*braneous* (skin-like), dry, or rarely succulent. It is sometimes expanded into *wings*, or bears a tuft of hair, cotton, or wool, called a *coma*. The inner coat is called the *tegmen*.

164. The *funicle* is the stalk by which the seed is attached to the placenta. It is occasionally enlarged into a membranous, pulpy, or fleshy appendage, sometimes spreading over a considerable part of the seed, or nearly enclosing it, called an *aril*. A *strophiole* or *caruncle* is a similar appendage proceeding from the testa by the side of or near the funicle.

165. The *hilum* is the scar left on the seed where it separates from the funicle. The *micropyle* is a mark indicating the position of the foramen of the ovule (133).

166. The **Embryo** (162) consists of the *Radicle* or base of the future root, one or two *Cotyledons* or future seed-leaves, and the *Plumule* or future bud within the base of the cotyledons. In some seeds, especially where there is no albumen, these several parts are very conspicuous, in others they are very difficult to distinguish until the seed begins to germinate. Their observation, however, is of the greatest importance, for it is chiefly upon the distinction between the embryo with one or with two cotyledons that are founded the two great classes of phænogamous plants, *Monocotyledons* and *Dicotyledons*.

167. Although the embryo lies loose (unattached) within the seed, it is generally in some determinate position with respect to the seed or to the whole fruit. This position is described by stating the direction of the radicle next to or more or less remote from the *hilum*, or it is said to be *superior* if pointing towards the summit of the fruit, *inferior* if pointing towards the base of the fruit.

### § 15. Accessory Organs.

168. Under this name are included, in many elementary works, various external parts of plants which do not appear to act any essential part either in the vegetation or reproduction of the plant. They may be classed under four heads: *Tendrils* and *Hooks*, *Thorns* and *Prickles*, *Hairs*, and *Glands*.

169. **Tendrils** (*cirrhæ*) are usually abortive petioles, or abortive peduncles, or sometimes abortive ends of branches. They are simple or more or less branched, flexible, and coil more or less firmly round any objects within their reach, in order to support the plant to which they belong. *Hooks* are similar holdfasts, but of a firmer consistence, not branched, and less coiled.

170. **Thorns** and **Prickles** have been fancifully called the weapons of plants. A *Thorn* or *Spine* is the strongly pointed extremity of a branch, or abortive petiole, or abortive peduncle. A *Prickle* is a sharply pointed excrescence from the epidermis, and is usually produced on a branch, on the petiole or veins of a leaf, or on a peduncle, or even on the calyx or corolla. When the teeth of a leaf or the stipules are pungent, they are also called *prickles*, not *thorns*. A plant is *spinous* if it has thorns, *aculeate* if it has prickles.

171. **Hairs**, in the general sense, or the *indumentum* (or clothing) of a plant, include all those productions of the epidermis which have, by a more or less appropriate comparison, been termed *bristles*, *hairs*, *down*, *cotton*, or *wool*.

172. Hairs are often branched. They are said to be *attached by the centre*, if parted from the base, and the forks spread along the surface in opposite directions; *plumose*, if the branches are arranged along a common axis, as in a feather; *stellate*, if several branches radiate horizontally. These stellate hairs have sometimes their rays connected together at the base, forming little flat circular disks attached by the centre, and are then called *scales*, and the surface is said to be *scaly* or *lepidote*.

173. The *Epidermis*, or outer skin, of an organ, as to its surface and indumentum, is *smooth*, when without any protuberance whatever.

*glabrous*, when without hairs of any kind.

*striate*, when marked with parallel longitudinal lines, either slightly raised or merely discoloured.

*furrowed* (*sulcate*) or *ribbed* (*costate*) when the parallel lines are more distinctly raised.



*rugose*, when wrinkled or marked with irregular raised or depressed lines.

*umbilicate*, when marked with a small round depression.

*umbonate*, when bearing a small boss like that of a shield.

*viscous*, *viscid*, or *glutinous*, when covered with a sticky or clammy exudation.

*scabrous*, when rough to the touch.

*tuberculate* or *warted*, when covered with small, obtuse, wart-like protuberances.

*muricate*, when the protuberances are more raised and pointed but yet short and hard.

*echinate*, when the protuberances are longer and sharper, almost prickly.

*setose* or *bristly*, when bearing very stiff erect straight hairs.

*glandular-setose*, when the setæ or bristles terminate in a minute resinous head or drop. In some works, especially in the case of *Roses* and *Rubus*, the meaning of *setæ* has been restricted to such as are glandular.

*glochidiate*, when the setæ are hooked at the top.

*pilose*, when the surface is thinly sprinkled with rather long simple hairs.

*hispid*, when more thickly covered with rather stiff hairs.

*hirsute*, when the hairs are dense and not so stiff.

*downy* or *pubescent*, when the hairs are short and soft; *puberulent*, when slightly pubescent.

*strigose*, when the hairs are rather short and stiff, and lie close along the surface all in the same direction; *strigillose*, when slightly strigose.

*tomentose* or *cottony*, when the hairs are very short and soft, rather dense and more or less intricate, and usually white or whitish.

*woolly* (*lanate*), when the hairs are long and loosely intricate, like wool. The wool or tomentum is said to be *floccose* when closely intricate and readily detached, like fleece.

*mealy* (*farinose*), when the hairs are excessively short, intricate and white, and come off readily, having the appearance of meal or dust.

*canescent* or *hoary*, when the hairs are so short as not readily to be distinguished by the naked eye, and yet give a general whitish hue to the epidermis.

*glaucous*, when of a pale bluish-green, often covered with a fine bloom.

174. The meanings here attached to the above terms are such as appear to have been most generally adopted, but there is much vagueness in the use practically made of many of them by different botanists. This is especially the case with the terms *pilose*, *hispid*, *hirsute*, *pubescent*, and *tomentose*.

175. The name of **Glands** is given to several different productions, and principally to the four following:—

1. Small wart-like or shield-like bodies, either sessile or sometimes stalked, of a fungous or somewhat fleshy consistence, occasionally secreting a small quantity of oily or resinous matter, but more frequently dry. They are generally few in number, often definite in their position and form, and occur chiefly on the petiole or principal veins of leaves, on the branches of inflorescences, or on the stalks or principal veins of bracts, sepals, or petals.

2. Minute raised dots, usually black, red, or dark-coloured, of a resinous or oily nature, always superficial, and apparently exudations from the epidermis. They are often numerous on leaves, bracts, sepals, and green branches, and occur even on petals and stamens, more rarely on pistils. When raised upon slender stalks they are called *pedicellate* (or *stipitate*) *glands*, or *glandular hairs*, according to the thickness of the stalk.

3. Small, globular, oblong or even linear vesicles, filled with oil, imbedded in the substance itself of leaves, bracts, floral organs, or fruits. They are often very numerous, like transparent dots, sometimes few and determinate in form and position. In the pericarp of *Umbellifera* they are remarkably regular and conspicuous, and take the name of *vittæ*.

4. Lobes of the disk (137), or other small fleshy excrescences within the flower, whether from the receptacle, calyx, corolla, stamens, or pistil.

## CHAP. II. CLASSIFICATION, OR SYSTEMATIC BOTANY.

176. It has already been observed (3) that descriptions of plants should, as nearly as possible, be arranged under natural divisions, so as to facilitate the comparison of each plant with those most nearly allied to it. The description of plants here alluded to are descriptions of *species*; the natural divisions of the Flora refer to natural *groups of species*.

177. A **Species** comprises all the individual plants which resemble each other sufficiently to make us conclude that they are all, or *may have been* all, descended from a common parent. These individuals may often differ from each other in many striking particulars, such as the colour of the flower, size of the leaf, etc., but these particulars are such as experience teaches us are liable to vary in the seedlings raised from one individual.

178. When a large number of the individuals of a species differ from the others in any striking particular they constitute a **Variety**. If the variety generally comes true from seed, it is often called a *Race*.

179. A *Variety* can only be propagated with certainty by grafts, cuttings, hulbs, tubers, or any other method which produces a new plant by the development of one or more buds taken from the old one. A *Race* may with care be propagated by seed, although seedlings will always be liable, under certain circumstances, to lose those particulars which distinguish it from the rest of the species. A real *Species* will always come true from seed.

180. The known species of plants (now near 100,000) are far too numerous for the human mind to study without classification, or even to give distinct single names to. To facilitate these objects, an admirable system, invented by Linnæus, has been universally adopted, viz. one common substantive name is given to a number of species which resemble each other more than they do any other species; the species so collected under one name are collectively called a **Genus**, the common name being the *generic* name. Each species is then distinguished from the others of the same genus by the addition of an adjective epithet or *specific* name. Every species has thus a botanical name of two words. In Latin, the language usually used for the purpose, the first word is a substantive and designates the genus; the second, an adjective, indicates the species.

181. The genera thus formed being still too numerous (above 6,000) for study without further arrangement, they have been classed upon the same principles; viz. genera which resemble each other more than they do any other genera, have been collected together into groups of a higher degree called **Families** or **Natural Orders**, to each of which a common name has been given. This name is in Latin an adjective plural, usually taken from the name of some one *typical* genus, generally the best known, the first discovered, or the most marked (e.g. *Ranunculaceæ* from *Ranunculus*). This is however for the purpose of study and comparison. To speak of a species, to refer to it and identify it, all that is necessary is to give the generic and specific names.

182. Natural Orders themselves (of which we reckon near 200) are often in the same manner collected into **Classes**; and where Orders contain a large number of genera, or genera a large number of species, they require further classification. The genera of an Order are then collected into minor groups called *Tribes*, the species of a genus into *Sections*, and in a few cases this intermediate classification is carried still further. The names of these several groups the most generally adopted are as follows, beginning with the most comprehensive or highest:—

Classes.	Genera.
Subclasses or <i>Alliances</i> .	Subgenera.
Natural Orders or Families.	Sections.
Suborders.	Subsections.
Tribes.	Species.
Subtribes.	Varieties.
Divisions.	
Subdivisions.	

183. The characters (3) by which a species is distinguished from all other species of

the same genus are collectively called the *specific character* of the plant ; those by which its genus is distinguished from other genera of the Order, or its Order from other Orders, are respectively called the *generic* or *ordinal* character, as the case may be. The *habit* of a plant, of a species, a genus, etc., consists of such general characters as strike the eye at first sight, such as size, colour, ramification, arrangement of the leaves, inflorescence, etc., and are chiefly derived from the organs of vegetation.

184. Classes, Orders, Genera, and their several subdivisions, are called *natural* when, in forming them, all resemblances and differences are taken into account, valuing them according to their evident or presumed importance ; *artificial*, when resemblances and differences in some one or very few particulars only are taken into account independently of all others.

185. The number of species included in a genus, or the number of genera in an Order, is very variable. Sometimes two or three or even a single species may be so different from all others as to constitute the entire genus ; in others, several hundred species may resemble each other so much as to be all included in one genus ; and there is the same discrepancy in the number of genera to a Family. There is moreover, unfortunately, in a number of instances, great difference of opinion as to whether certain plants differing from each other in certain particulars are varieties of one species or belong to distinct species ; and again, whether two or more groups of species should constitute as many sections of one genus, or distinct genera, or tribes of one Order, or even distinct Natural Orders. In the former case, as a species is supposed to have a real existence in nature, the question is susceptible of argument, and sometimes of absolute proof. But the place a group should occupy in the scale of degree is very arbitrary, being often a mere question of convenience. The more subdivisions upon correct principles are multiplied, the more they facilitate the study of plants, provided always the main resting-points for constant use, the Order and the Genus, are comprehensive and distinct. But if every group into which a genus can be divided be erected into a distinct genus, with a substantive name to be remembered whenever a species is spoken of, all the advantages derived from the beautiful simplicity of the Linnæan nomenclature are gone.

### CHAP. III. VEGETABLE ANATOMY AND PHYSIOLOGY.

#### § 1. *Structure and Growth of the Elementary Tissues.*

186. If a very thin slice of any part of a plant be placed under a microscope of high magnifying power, it will be found to be made up of variously shaped and arranged ultimate parts, forming a sort of honeycombed structure. These ultimate parts are called *cells*, and form by their combination the *elementary tissues* of which the entire plant is composed.

187. A cell in its simplest state is a closed membranous sac, formed of a substance permeable by fluids, though usually destitute of visible pores. Each cell is a distinct individual, separately formed and separately acting, though cohering with the cells with which it is in contact, and partaking of the common life and action of the tissue of which it forms a part. The membranes separating or enclosing the cells are also called their *walls*.

188. Botanists usually distinguish the following tissues :—

(1) *Cellular tissue*, or *parenchyma*, consists usually of thin-walled cells, more or less round in form, or with their length not much exceeding their breadth, and not tapering at the ends. All the soft parts of the leaves, the pith of stems, the pulp of fruits, and all young growing parts, are formed of it. It is the first tissue produced, and continues to be formed while growth continues, and when it ceases to be active the plant dies.

(2) *Woody tissue*, or *prosenchyma*, differs in having its cells considerably longer than broad, usually tapering at each end into points and overlapping each other. The cells are commonly thick-walled ; the tissue is firm, tenacious, and elastic, and constitutes



the principal part of wood, of the inner bark, and of the nerves and veins of leaves, forming, in short, the framework of the plant.

(3) *Vascular tissue*, or the *vessels* or *ducts* of plants, so called from the mistaken notion that their functions are analogous to those of the vessels (veins and arteries) of animals. A *vessel* in plants consists of a vertical row of cells, which have their transverse partition-walls obliterated, so as to form a continuous tube. All phænogamous plants, as well as ferns and a few other cryptogamous plants, have vessels, and are therefore called *vascular plants*; so the majority of cryptogams having only cellular tissue are termed *cellular plants*. Vessels have their sides very variously marked; some, called *spiral vessels*, have a spiral fibre coiled up their inside, which unrolls when the vessel is broken; others are marked with longitudinal slits, cross bars, minute dots or pits, or with transverse rings. The size of vessels is also very variable in different plants; in some they are of considerable size and visible to the naked eye in cross sections of the stem, in others they are almost absent or can only be traced under a strong magnifier.

189. Various modifications of the above tissues are distinguished by vegetable anatomists under names which need not be enumerated here as not being in general practical use. *Air-vessels*, *cysts*, *turpentine-vessels*, *oil-reservoirs*, etc., are either cavities left between the cells, or large cells filled with peculiar secretions.

190. When tissues are once formed, they increase, not by the general enlargement of the whole of the cells already formed, but by *cell-division*, that is, by the division of young and vitally active cells, and the enlargement of their portions. In the formation of the embryo, the first cell of the new plant is formed, not by division, but around a segregate portion of the contents of a previously existing cell, the embryo-sac. This is termed *free cell-formation*, in contradistinction to cell-division.

191. A young and vitally active cell consists of the *outer wall*, formed of a more or less transparent substance called *cellulose*, permeable by fluids, and of ternary chemical composition (carbon, hydrogen, and oxygen); and of the *cell-contents*, usually viscid or mucilaginous, consisting of *protoplasm*, a substance of quaternary chemical composition (carbon, hydrogen, oxygen, and nitrogen), which fills an important part in cell-division and growth. Within the cell (either in the centre or excentrical) is usually a minute, soft, subgelatinous body called the *nucleus*, whose functions appear to be intimately connected with the first formation of the new cell. As this cell increases in size, and its walls in thickness, the protoplasm and watery cell-sap become absorbed or dried up, the firm cellulose wall alone remaining as a permanent fabric, either empty or filled with various organized substances produced or secreted within it.

192. The principal organized contents of cells are  
*sap*, the first product of the digestion of the food of plants; it contains the elements of vegetable growth in a dissolved condition.

*sugar*, of which there are two kinds, called *cane-sugar* and *grape-sugar*. It usually exists dissolved in the sap. It is found abundantly in growing parts, in fruits, and in germinating seeds.

*dextrine*, or vegetable mucilage, a gummy substance, between mucilage and starch.

*starch* or *fecula*, one of the most universal and conspicuous of cell-contents, and often so abundant in farinaceous roots and seeds as to fill the cell-cavity. It consists of minute grains called *starch-granules*, which vary in size and are marked with more or less conspicuous concentric lines of growth. The chemical constitution of starch is the same as that of cellulose; it is unaffected by cold water, but forms a jelly with boiling water, and turns blue when tested by iodine. When fully dissolved it is no longer starch, but dextrine.

*chlorophyll*, very minute granules, containing nitrogen, and coloured green under the action of sunlight. These granules are most abundant in the layers of cells immediately below the surface or epidermis of leaves and young bark. The green colouring matter is soluble in alcohol, and may thus be removed from the granules.

*chromule*, a name given to a similar colouring matter when not green.

*wax*, *oils*, *camphor*, and *resinous* matter, are common in cells or in cavities in the tissues between the cells, also various mineral substances, either in an amorphous state or as microscopic crystals, when they are called *Raphides*.

§ 2. *Arrangement of the Elementary Tissues, or Structure of the Organs of Plants.*

193. Leaves, young stems, and branches, and most parts of phænogamous plants, during the first year of their existence consist anatomically of

1, a *cellular system*, or continuous mass of cellular tissue, which is developed both vertically as the stem or other parts increase in length, and horizontally or laterally as they increase in thickness or breadth. It surrounds or is intermixed with the fibro-vascular system, or it may exist alone in some parts of phænogamous plants, as well as in cryptogamous ones.

2, a *fibro-vascular system*, or continuous mass of woody and vascular tissue, which is gradually introduced vertically into, and serves to bind together, the cellular system. It is continued from the stem into the petioles and veins of the leaves, and into the pedicels and parts of the flowers, and is never wholly wanting in any phænogamous plant.

3, an *epidermis*, or outer skin, formed of one or more layers of flattened (horizontal), firmly coherent, and usually empty cells, with either thin and transparent or thick and opaque walls. It covers almost all parts of plants exposed to the outward air, protecting their tissues from its immediate action, but is wanting in those parts of aquatic plants which are constantly submerged.

194. The epidermis is frequently pierced by minute spaces between the cells, called *Stomates*. They are oval or mouth-shaped, bordered by *lips*, formed of two or more elastic cells so disposed as to cause the stomate to open in a moist, and to close up in a dry state of the atmosphere. They communicate with intercellular cavities, and are obviously designed to regulate evaporation and respiration. They are chiefly found upon leaves, especially on the under surface.

195. When a phænogamous plant has outlived the first season of its growth, the anatomical structure of its stem or other perennial parts becomes more complicated and very different in the two great classes of phænogamous plants called *Exogens* and *Endogens*, which correspond with very few exceptions to the two classes Dicotyledons and Monocotyledons (167), founded on the structure of the embryo. In *Exogens* (Dicotyledons) the woody system is placed in concentric layers between a central *pith* (198, 1), and an external separable *bark* (1985). In *Endogens* (Monocotyledons) the woody system is in separate small bundles or fibres running through the cellular system without apparent order, and there is usually no distinct central pith, nor outer separable bark.

196. The anatomical structure is also somewhat different in the different organs of plants. In the **Root**, although it is constructed generally on the same plan as the stem, yet the regular organization, and the difference between *Exogens* and *Endogens*, is often disguised or obliterated by irregularities of growth, or by the production of large quantities of cellular tissue filled with starch or other substances (192). There is seldom, if ever, any distinct pith, the concentric circles of fibro-vascular tissue in *Exogens* are often very indistinct or have no relation to seasons of growth, and the epidermis has no stomates.

197. In the **Stem** or branches, during the first year or season of their growth, the difference between *Exogens* and *Endogens* is not always very conspicuous. In both there is a tendency to a circular arrangement of the fibro-vascular system, leaving the centre either vacant or filled with cellular tissue (*pith*) only, and a more or less distinct outer rind is observable even in several *Endogens*. More frequently, however, the distinction is already very apparent the first season, especially towards its close. The fibro-vascular bundles in *Endogens* usually anastomose but little, passing continuously into the branches and leaves. In *Exogens* the circle of fibro-vascular bundles forms a more continuous cylinder of network emitting lateral offsets into the branches and leaves.

198. The Exogenous stem, after the first year of its growth, consists of

1, the *pith*, a cylinder of cellular tissue, occupying the centre or longitudinal axis of the stem. It is active only in young stems or branches, becomes dried up and compressed as the wood hardens, and often finally disappears, or is scarcely distinguishable in old trees.

2, the *medullary sheath*, which surrounds and encases the pith. It abounds in spiral vessels (188, 3), and is in direct connection, when young, with the leaf-buds and

branches, with the petioles and veins of leaves, and other ramifications of the system. Like the pith, it gradually disappears in old wood.

3, the *wood*, which lies immediately outside the medullary sheath. It is formed of woody tissue (188, 2), through which, in most cases, vessels (188, 3) variously disposed are interspersed. It is arranged in annual concentric circles (211), which usually remain active during several years, but in older stems the central and older layers become hard, dense, comparatively inactive, and usually deeper coloured, forming what is called *heart-wood* or *duramen*, the outer, younger, and usually paler-coloured living layers constituting the *sapwood* or *alburnum*.

4, the *medullary rays*, which form vertical plates, originating in the pith, and, radiating from thence, traverse the wood and terminate in the bark. They are formed of cellular tissue, keeping up a communication between the living portion of the centre of the stem and its outer surface. As the heart-wood is formed, the inner portion of the medullary rays ceases to be active, but they usually may still be seen in old wood, forming what carpenters call the *silver grain*.

5, the *bark*, which lies outside the wood, within the epidermis. It is, like the wood, arranged in annual concentric circles (211), of which the outer older ones become dry and hard, forming the *corky layer* or *outer bark*, which, as it is distended by the thickening of the stem, either cracks or is cast off with the epidermis, which is no longer distinguishable. Within the corky layer is the *cellular*, or *green*, or *middle bark*, formed of loose thin-walled pulpy cells containing chlorophyll (192); and which is usually the layer of the preceding season. The innermost and youngest circle, next the young wood, is the *liber* or *inner bark*, formed of long tough woody tissue called *bast-cells*.

199. The Endogenous stem, as it grows old, is not marked by the concentric circles of Exogens. The wood consists of a *matrix* of cellular tissue irregularly traversed by vertical cords or bundles of woody and vascular tissue, which are in connection with the leaves. These vascular bundles change in structure and direction as they pass down the stem, losing their vessels, they retain only their bast- or long wood-cells, usually curving outwards towards the rind. The old wood becomes more compact and harder towards the circumference than in the centre. The epidermis or rind either hardens so as to prevent any increase of diameter in the stem, or it distends, without increasing in thickness or splitting or casting off any outer layers.

200. In the **Leaf**, the structure of the petioles and principal ribs or veins is the same as that of the young branches of which they are ramifications. In the expanded portion of the leaf the fibro-vascular system becomes usually very much ramified, forming the smaller veins. These are surrounded and the interstices filled up by a copious and very active cellular tissue. The majority of leaves are horizontal, having a differently constructed upper and under surface. The cellular stratum forming the upper surface consists of closely set cells, placed vertically, with their smallest ends next the surface, and with few or no stomates in the epidermis. In the stratum forming the under surface, the cells are more or less horizontal, more loosely placed, and have generally empty spaces between them, with stomates in the epidermis communicating with these intercellular spaces. In vertical leaves (as in a large number of Australian plants) the two surfaces are nearly similar in structure.

201. When leaves are reduced to scales, acting only as protectors of young buds, or without taking any apparent part in the economy of vegetable life, their structure, though still on the same plan, is more simple; their fibro-vascular system is less ramified, their cellular system more uniform, and there are few or no stomates.

202. Bracts and floral envelopes, when green and much developed, resemble leaves in their anatomical structure, but in proportion as they are reduced to scales or transformed into petals, they lose their stomates, and their systems, both fibro-vascular and cellular, become more simple and uniform, or more slender and delicate.

203. In the stamens and pistils the structure is still nearly the same. The fibro-vascular system, surrounded by and intermixed with the cellular tissue, is usually simple in the filaments and style, more or less ramified in the flattened or expanded parts, such as the anther-cases, the walls of the ovary, or carpellary leaves, etc. The pollen consists of granular cells variously shaped, marked, or combined, peculiar forms being constant in the same species, or often in large genera, or even Orders. The stigmatic portion of the pistil is a mass of loosely cellular substance, destitute of epidermis, and



usually is in communication with the ovary by a channel running down the centre of the style.

204. Tubers, fleshy thickenings of the stem or other parts of the plant, succulent leaves or branches, the fleshy, woody, or bony parts of fruits, the albumen, and the thick fleshy parts of embryos, consist chiefly of largely developed cellular tissue, replete with starch or other substances (192), deposited apparently in most cases for the eventual future use of the plant or its parts when recalled into activity at the approach of a new season.

205. Hairs (171) are usually expansions or processes of the epidermis, and consist of one or more cells placed end to end. When thick or hardened into prickles, they still consist usually of cellular tissue only. Thorns (170) contain more or less of a fibro-vascular system, according to their degree of development.

206. Glands, in the primary sense of the word (175, 1), consist usually of a rather loose cellular tissue without epidermis, and often replete with resinous or other substances.

### § 3. *Growth of the Organs.*

207. Roots grow in length constantly and regularly at the extremities only of their fibres, in proportion as they find the requisite nutriment. They form no buds containing the germ of future branches, but their fibres proceed irregularly from any part of their surface without previous indication, and when their growth has been stopped for a time, either wholly by the close of the season, or partially by a deficiency of nutriment at any particular spot, it will, on the return of favourable circumstances, be resumed at the same point, if the growing extremities be uninjured. If during the dead season, or at any other time, the growing extremity is cut off, dried up, or otherwise injured, or stopped by a rock or other obstacle opposing its progress, lateral fibres will be formed on the still living portion; thus enabling the root as a whole to diverge in any direction, and travel far and wide when lured on by appropriate nutriment.

208. This growth is not however by the successive formation of terminal cells attaining at once their full size. The cells first formed on a fibre commencing or renewing its growth, will often dry up and form a kind of terminal cap, which is pushed on as cells are formed immediately under it; and the new cells, constituting a greater or lesser portion of the ends of the fibres, remain some time in a growing state before they have attained their full size.

209. The roots of Exogens, when perennial, increase in thickness like stems by the addition of concentric layers, but these are usually much less distinctly marked; and in a large number of perennial Exogens and most Endogens the roots are annual, perishing at the close of the season, fresh adventitious roots springing from the stock when vegetation commences the following season.

210. The Stem, including its branches and appendages (leaves, floral organs, etc.), grows in length by additions to its extremity, but a much greater proportion of the extremity and branches remains in a growing and expanding state for a much longer time than in the case of the root. At the close of one season, leaf-buds or seeds are formed, each containing the germ of a branch or young plant to be produced the following season. At a very early stage of the development of these buds or seeds, a commencement may be found of many of the leaves it is to bear; and before a leaf unfolds, every leaflet of which it is to consist, every lobe or tooth which is to mark its margin, may often be traced in miniature, and thenceforth till it attains its full size, the branch grows and expands in every part. In some cases however the lower part of a branch and more rarely (*e.g.* in some *Meliaceæ*) the lower part of a compound leaf attains its full size before the young leaves or leaflets of the extremity are yet formed.

211. The perennial stem, if exogenous (198), grows in thickness by the addition every season of a new layer or ring of wood between the outermost preceding layer and the inner surface of the bark, and by the formation of a new layer or ring of bark within the innermost preceding layer and outside the new ring of wood, thus forming a succession of concentric circles. The sap elaborated by the leaves finds its way, in a manner not as yet absolutely ascertained, into the *cambium-region*, a zone of tender thin-walled cells connecting the wood with the bark, by the division and enlargement of which new

cells (190) are formed. These cells separate in layers, the inner ones constituting the new ring of wood, and the outer ones the new bark or liber. In most exogenous trees, in temperate climates, the seasons of growth correspond with the years, and the rings of wood remain sufficiently distinct to indicate the age of the tree; but in many tropical and some evergreen trees, two or more rings of wood are formed in one year.

212. In endogenous perennial stems (199), the new wood or woody fibre is formed towards the centre of the stem, or irregularly mingled with the old. The stem consequently either only becomes more dense without increasing in thickness, or only increases by gradual distention, which is never very considerable. It affords therefore no certain criterion for judging of the age of the tree.

213. Flowers have generally all their parts formed, or indicated by protuberances or growing cells at a very early stage of the bud. These parts are then usually more regularly placed than in the fully developed flower. Parts which afterwards unite are then distinct, many are present in this rudimentary state which are never further developed, and parts which are afterwards very unequal or dissimilar are perfectly alike at this early period. On this account flowers in this very early stage are supposed by some modern botanists to be more *normal*, that is, more in conformity to a supposed type; and the study of the early formation and growth of the floral organs, called *Organogenesis*, has been considered essential for the correct appreciation of the affinities of plants. In some cases, however, it would appear that modifications of development, not to be detected in the very young bud, are yet of great importance in the distinction of large groups of plants, and that *Organogenesis*, although it may often assist in clearing up a doubtful point of affinity, cannot nevertheless be exclusively relied on in estimating the real value of peculiarities of structure.

214. The flower is considered as a *bud* (*flower-bud*, *alabastrum*) until the perianth expands, the *period of flowering* (*anthesis*) is that which elapses from the first expanding of the perianth, till the pistil is set or begins to enlarge, or, when it does not set, until the stamens and pistil wither or fall. After that, the enlarged ovary takes the name of *young fruit*.

215. At the close of the season of growth, at the same time as the leaf-buds or seeds are formed containing the germ of future branches or plants, many plants form also, at or near the bud or seed, large deposits, chiefly of starch. In many cases,—such as the tubers of a potato or other root-stock, the scales or thickened base of a bulb, the albumen or the thick cotyledons of a seed,—this deposit appears to be a store of nutriment, which is partially absorbed by the young branch or plant during its first stage of growth, before the roots are sufficiently developed to supply it from without. In some cases, however, such as the fleshy thickening of some stems or peduncles, the pericarps of fruits which perish long before *germination* (the first growth of the seed), neither the use nor the cause of these deposits has as yet been clearly explained.

#### § 4. *Functions of the Organs.*

216. The functions of the Root are,—1. To fix the plant in or to the soil or other substance on which it grows. 2. To absorb nourishment from the soil, water, or air, into which the fibres have penetrated (or from other plants in the case of parasites), and to transmit it rapidly to the stem. The absorption takes place through the young growing extremities of the fibres, and through a peculiar kind of hairs or absorbing organs which are formed at or near those growing extremities. The transmission to the stem is through the tissues of the root itself. The nutriment absorbed consists chiefly of carbonic acid and nitrogen or nitrogenous compounds dissolved in water. 3. In some cases roots secrete or exude small quantities of matter in a manner and with a purpose not satisfactorily ascertained.

217. The stem and its branches support the leaves, flowers, and fruit, transmit the crude sap, or nutriment absorbed by the roots and mixed with previously organized matter, to the leaves, and re-transmit the assimilated or elaborated sap from the leaves to the growing parts of the plant, to be there used up, or to form deposits for future use (204). The transmission of the ascending crude sap appears to take place chiefly through the elongated cells associated with the vascular tissues, passing from one cell to another by a process but little understood, but known by the name of *endosmose*.

218. Leaves are functionally the most active of the organs of vegetation. In them is chiefly conducted digestion or *Assimilation*, a name given to the process which accomplishes the following results:—1. The chemical decomposition of the oxygenated matter of the sap, the absorption of carbonic acid, and the liberation of pure oxygen at the ordinary temperature of the air. 2. A counter-operation by which oxygen is absorbed from the atmosphere and carbonic acid is exhaled. 3. The transformation of the residue of the crude sap into the organized substances which enter into the composition of the plant. The exhalation of oxygen appears to take place under the influence of solar heat and light, chiefly from the under surface of the leaf, and to be in some measure regulated by the stomates; the absorption of oxygen goes on always in the dark, and in the daytime also in certain cases. The transformation of the sap is effected within the tissues of the leaf, and continues probably more or less throughout the active parts of the whole plant.

219. The Floral Organs seldom contribute to the growth of the plant on which they are produced; their functions are wholly concentrated on the formation of the seed with the germ of a future plant.

220. The Perianth (calyx and corolla) acts in the first instance in protecting the stamens and pistils during the early stages of their development. When expanded, the use of the brilliant colours which they often display, of the sweet or strong odours they emit, has not been adequately explained. Perhaps they may have great influence in attracting those insects whose concurrence has been shown in many cases to be necessary for the due transmission of the pollen from the anther to the stigma.

221. The pistil, when stimulated by the action of the pollen, forms and nourishes the young seed. The varied and complicated contrivances by which the pollen is conveyed to the stigma, whether by elastic action of the organs themselves, or with the assistance of wind, of insects, or other extraneous agents, have been the subject of numerous observations and experiments of the most distinguished naturalists, and are yet far from being fully investigated. Their details, however, as far as known, would be far too long for the present outline.

222. The fruit nourishes and protects the seed until its maturity, and then often promotes its dispersion by a great variety of contrivances or apparently collateral circumstances, *e.g.* by an elastic dehiscence which casts the seed off to a distance; by the development of a pappus, wings, hooked or other appendages, which allows them to be carried off by winds, or by animals, etc., to which they may adhere; by their small specific gravity, which enables them to float down streams; by their attractions to birds, etc., who taking them for food drop them often at great distances, etc. Appendages to the seeds themselves also often promote dispersion.

223. Hairs have various functions. The ordinary indumentum (171) of stems and leaves indeed seems to take little part in the economy of the plant besides perhaps some occasional protection against injurious atmospheric influences, but the root-hairs (216) are active absorbents, the hairs on styles and other parts of flowers appear often materially to assist the transmission of pollen, and the exudations of glandular hairs (175, 2) are often too copious not to exercise some influence on the phenomena of vegetation. The whole question, however, of vegetable exudations and their influence on the economy of vegetable life, is as yet but imperfectly understood.

---

#### CHAP. IV. COLLECTION, PRESERVATION, AND DETERMINATION OF PLANTS.

224. Plants can undoubtedly be most easily and satisfactorily examined when freshly gathered. But time will rarely admit of this being done, and it is moreover desirable to compare them with other plants previously observed or collected. *Specimens* must, therefore, be selected for leisurely observation at home, and preserved for future reference. A collection of such specimens constitutes a *Herbarium*.

225. A botanical **Specimen**, to be perfect, should have *root, stem, leaves, flowers* (both open and in the bud), and *fruit* (both young and mature). It is not, however, always possible to gather such complete specimens, but the collector should aim at



completeness. Fragments, such as leaves without flowers, or flowers without leaves, are of little or no use.

226. If the plant is small (not exceeding 15 in.) or can be reduced to that length by folding, the specimen should consist of the whole plant, including the principal part of the root. If it be too large to preserve the whole, a good flowering-branch should be selected, with the foliage as low down as can be gathered with it; and one or two of the lower stem-leaves or radical leaves, if any, should be added, so as to preserve as much as possible of the peculiar aspect of the plant.

227. The specimens should be taken from healthy uninjured plants of a medium size. Or if a specimen be gathered because it looks a little different from the majority of those around it, apparently belonging to the same species, a specimen of the more prevalent form should be taken from the same locality for comparison.

228. For bringing the specimens home, a light portfolio of pasteboard, covered with calico or leather, furnished with straps and buckles for closing, and another for slinging on the shoulder, and containing a few sheets of stout coarse paper, is better than the old-fashioned tin box (except, perhaps, for stiff prickly plants and a few others). The specimens as gathered are placed between the leaves of paper, and may be crowded together if not left long without sorting.

229. If the specimen brought home be not immediately determined when fresh, but dried for future examination, a note should be taken of the time, place, and situation in which it was gathered; of the stature, habit, and other particulars relating to any tree, shrub, or herb of which the specimen is only a portion; of the kind of root it has; of the colour of the flower; or of any other particulars which the specimen itself cannot supply, or which may be lost in the process of drying. These memoranda, whether taken down in the field, or from the living specimen when brought home, should be written on a label attached to the specimen or preserved with it.

230. To dry specimens, they are laid flat between several sheets of bibulous paper, and subjected to pressure. The paper is subsequently changed at intervals, until they are dry.

231. In laying out the specimen, care should be taken to preserve the natural position of the parts as far as consistent with the laying flat. In general, if the specimen is fresh and not very slender, it may be simply laid on the lower sheet, holding it by the stalk and drawing it slightly downwards; then, as the upper sheet is laid over, if it be slightly drawn downwards as it is pressed down, it will be found, after a few trials, that the specimen will have retained a natural form with very little trouble. If the specimen has been gathered long enough to have become flaccid, it will require more care in laying the leaves flat and giving the parts their proper direction. Specimens kept in tin boxes, will also often have taken unnatural bends which will require to be corrected.

232. If the specimen is very bushy, some branches must be thinned out, but always so as to show where they have been. If any part, such as the head of a thistle, the stem of an *Orobanche*, or the bulb of a Lily, be very thick, a portion of what is to be the under side of the specimen may be sliced off. Some thick specimens may be split from top to bottom before drying.

233. If the specimen be succulent or tenacious of life, such as a *Sedum* or an *Orchis*, it may be dipped in boiling water *all but the flowers*. This will kill the plant at once, and enable it to be dried rapidly, losing less of its colour or foliage than would otherwise be the case. Dipping in boiling water is also useful in the case of Heaths and other plants which are apt to shed their leaves during the process of drying.

234. Plants with very delicate corollas may be placed between single leaves of very thin unglazed tissue-paper. In shifting these plants into dry paper the tissue-paper is not to be removed, but lifted with its contents on to the dry paper.

235. The number of sheets of paper to be placed between each specimen or sheet of specimens, will depend, on the one hand, on the thickness and humidity of the specimens; on the other hand, on the quantity and quality of the paper one has at command. The more and the better the paper, the less frequently will it be necessary to change



it, and the sooner the plants will dry. The paper ought to be coarse, stout, and unsized. Common blotting-paper is much too tender.

236. Care must be taken that the paper used is well dried. If it be likewise hot, all the better; but it must then be very dry; and wet plants put into hot paper will require changing very soon, to prevent their turning black, for hot damp without ventilation produces fermentation, and spoils the specimens.

237. For pressing plants, various more or less complicated and costly presses are made. None is better than a pair of boards the size of the paper, and a stone or other heavy weight upon them if at home, or a pair of strong leather straps round them if travelling. Each of these boards should be double, that is, made of two layers of thin boards, the opposite way of the grain, and joined together by a row of clenched brads round the edge, without glue. Such boards, in deal, rather less than half an inch thick (each layer about  $2\frac{1}{2}$  lines) will be found light and durable.

238. It is useful also to have extra boards or pasteboards the size of the paper, to separate thick plants from thin ones, wet ones from those nearly dry, etc. Open wooden frames with cross-bars, or frames of strong wire-work lattice, are still better than boards for this purpose, as accelerating the drying by promoting ventilation.

239. The more frequently the plants are shifted into dry paper the better. Excepting for very stiff or woody plants, the first pressure should be light, and the first shifting, if possible, after a few hours. Then, or at the second shifting, when the specimens will have lost their elasticity, will be the time for putting right any part of a specimen which may have taken a wrong fold or a bad direction. After this the pressure may be gradually increased, and the plants left from one to several days without shifting. The exact amount of pressure to be given will depend on the consistence of the specimens and the amount of paper. It must only be borne in mind that too much pressure crushes the delicate parts, too little allows them to shrivel, in both cases interfering with their future examination.

240. The most convenient specimens will be made, if the drying-paper is the same size as that of the herbarium in which they are to be kept. That of writing-demy, rather more than 16 inches by  $10\frac{1}{2}$  inches, is a common and very convenient size. A small size reduces the specimens too much, a large size is both costly and inconvenient for use.

241. When the specimens are quite dry and stiff, they may be packed up in bundles with a single sheet of paper between each layer, and this paper need not be bibulous. The specimens may be placed very closely on the sheets, but not in more than one layer on each sheet, and care must be taken to protect the bundles by sufficient covering from the effects of external moisture or the attacks of insects.

242. In laying the specimens into the herbarium, no more than one species should ever be fastened on one sheet of paper, although several specimens of the same species may be laid side by side. And throughout the process of drying, packing, and laying in, great care must be taken that the labels be not separated from the specimens they belong to.

243. To examine or dissect flowers or fruits in dried specimens it is necessary to soften them. If the parts are very delicate, this is best done by gradually moistening them in cold water; in most cases, steeping them in boiling water or in steam is much quicker. Very hard fruits and seeds will require boiling to be able to dissect them easily.

244. For dissecting and examining flowers in the field, all that is necessary is a pen-knife and a pocket-lens of two or three glasses from 1 to 2 inches focus. At home it is more convenient to have a mounted lens or simple microscope, with a stage holding a glass plate, upon which the flowers may be laid; and a pair of dissectors, one of which should be narrow and pointed, or a mere point, like a thick needle, in a handle; the other should have a pointed blade, with a sharp edge, to make clean sections across the ovary. A compound microscope is rarely necessary, except in cryptogamic botany and vegetable anatomy. For the simple microscope, lenses of  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1, and  $1\frac{1}{2}$  inches focus are sufficient.

245. To assist the student in *determining* or ascertaining the name of a plant belonging to a Flora, analytical tables should be prefixed to the Orders, Genera, and

Species. These tables should be so constructed as to contain, under each bracket, or equally indented, two (rarely three or more) alternatives as nearly as possible contradictory or incompatible with each other, each alternative referring to another bracket, or having under it another pair of alternatives further indented. The student having a plant to determine, will first take the general table of Natural Orders, and examining his plant at each step to see which alternative agrees with it, will be led on to the Order to which it belongs; he will then compare it with the detailed character of the Order given in the text. If it agrees, he will follow the same course with the table of the genera of that Order, and again with the table of species of the genus. But in each case, if he finds that his plant does not agree with the detailed description of the genus or species to which he has thus been referred, he must revert to the beginning and carefully go through every step of the investigation before he can be satisfied. A fresh examination of his specimen, or of others of the same plant, a critical consideration of the meaning of every expression in the characters given, may lead him to detect some minute point overlooked or mistaken, and put him into the right way. Species vary within limits which it is often very difficult to express in words, and it proves often impossible, in framing these analytical tables, so to divide the genera and species, that those which come under one alternative should absolutely exclude the others. In such doubtful cases both alternatives must be tried before the student can come to the conclusion that his plant is not contained in the Flora, or that it is erroneously described.

246. In those Floras where analytical tables are not given, the student is usually guided to the most important or prominent characters of each genus or species, either by a general summary prefixed to the genera of an Order or to the species of the genus, for all such genera or species; or by a special summary immediately preceding the detailed description of each genus or species. In the latter case this summary is called a *diagnosis*. Or sometimes the important characters are only indicated by italicizing them in the detailed description.

247. It may also happen that the specimen gathered may present some occasional or accidental anomalies peculiar to that single one, or to a very few individuals, which may prevent the species from being at once recognized by its technical characters. It may be useful here to point out a few of these anomalies which the botanist may be most likely to meet with. For this purpose we may divide them into two classes, viz.:

1. *Aberrations from the ordinary type or appearance of a species for which some general cause may be assigned.*

A bright, light, and open situation, particularly at considerable elevations above the sea, or at high latitudes, without too much wet or drought, tends to increase the size and heighten the colour of flowers, in proportion to the stature and foliage of the plant.

Shade, on the contrary, especially if accompanied by richness of soil and sufficient moisture, tends to increase the foliage and draw up the stem, but to diminish the number, size, and colour of the flowers.

A hot climate and dry situation tend to increase the hairs, prickles, and other productions of the epidermis, to shorten and stiffen the branches, rendering thorny plants yet more spinous. Moisture in a rich soil has a contrary effect.

The neighbourhood of the sea, or a saline soil or atmosphere, imparts a thicker and more succulent consistence to the foliage and almost every part of the plant, and appears not unfrequently to enable plants usually annual to live through the winter. Flowers in a maritime variety are often much fewer, but not smaller.

The luxuriance of plants growing in a rich soil, and the dwarf stunted character of those crowded in poor soils, are too well known to need particularizing. It is also an everyday observation how gradually the specimens of a species become dwarf and stunted as we advance into the cold damp regions of the summits of high mountain-ranges, or into high northern latitudes; and yet it is frequently from the want of attention to these circumstances that numbers of false species have been added to our Enumerations and Floras. Luxuriance entails not only increase of size to the whole plant, or of particular parts, but increase of number in branches, in leaves, or leaflets of a compound leaf; or it may diminish the hairiness of the plant, induce thorns to grow out into branches, etc.

Capsules which, while growing, lie close upon the ground, will often become larger, more succulent, and less readily deliscent, than those which are not so exposed to the moisture of the soil.

Herbs eaten down by sheep or cattle, or crushed underfoot, or otherwise checked in their growth, or trees or shrubs cut down to the ground, if then exposed to favourable circumstances of soil and climate, will send up luxuriant side-shoots, often so different in the form of their leaves, in their ramification and inflorescence, as to be scarcely recognizable for the same species.

Annuals which have germinated in spring, and flowered without check, will often be very different in aspect from individuals of the same species, which, having germinated later, are stopped by summer droughts or the approach of winter, and only flower the following season upon a second growth. The latter have often been mistaken for perennials.

Hybrids, or crosses between two distinct species, come under the same category of anomalous specimens from a known cause. Frequent as they are in gardens, where they are artificially produced, they are probably rare in nature, although on this subject there is much diversity of opinion, some believing them to be very frequent, others almost denying their existence. Absolute proof of the origin of a plant found wild, is of course impossible; but it is pretty generally agreed that the following particulars must always co-exist in a *wild hybrid*. It partakes of the characters of its two parents; it is to be found isolated, or almost isolated, in places where the two parents are abundant; if there are two or three, they will generally be dissimilar from each other, one partaking more of one parent, another of the other; it seldom ripens good seed; it will never be found where one of the parents grows alone.

Where two supposed species grow together, intermixed with numerous intermediates bearing good seed, and passing more or less gradually from the one to the other, it may generally be concluded that the whole are mere varieties of one species. The beginner, however, must be very cautious not to set down a specimen as intermediate between two species, because it appears to be so in some, even the most striking characters, such as stature and foliage. Extreme varieties of one species are connected together by transitions in all their characters, but these transitions are not all observable in the same specimens. The observation of a single intermediate is therefore of little value, unless it be one link in a long series of intermediate forms, and, when met with, should lead to the search for the other connecting links.

2. *Accidental aberrations from the ordinary type, that is, those of which the cause is unknown.*

These require the more attention, as they may sometimes lead the beginner far astray in his search for the genus, whilst the aberrations above-mentioned as reducible more or less to general laws, affect chiefly the distinction of species.

Almost all species with coloured flowers are liable to occur occasionally with them all white.

Many may be found even in a wild state with double flowers, that is, with a multiplication of petals.

Plants which have usually conspicuous petals will occasionally appear without any at all, either to the flowers produced at particular seasons, or to all the flowers of individual plants, or the petals may be reduced to narrow slips.

Flowers usually very irregular, may, on certain individuals, lose more or less of their irregularity, or appear in some very different shape. Spurs, for instance, may disappear, or be produced on all instead of one only of the petals.

One part may be occasionally added to, or subtracted from, the usual number of parts in each floral whorl, more especially in regular polypetalous flowers.

Plants usually monœcious or diœcious may become occasionally hermaphrodite, or hermaphrodite plants may produce occasionally unisexual flowers by the abortion of the stamens or of the pistils.

Leaves cut or divided where they are usually entire, variegated or spotted where they are usually of one colour, or the reverse, must also be classed amongst those accidental aberrations which the botanist must always be on his guard against mistaking for specific distinctions.

## INDEX OF TERMS, OR GLOSSARY.

*The Figures refer to the Paragraphs of the Outlines.*

	Par.		Par.		Par.
Aberrations . . . . .	247	Apex . . . . .	36, 47, 115	Biternate . . . . .	44
Abortive . . . . .	84	Apiculate = with a little point.		Blade . . . . .	35
Abruptly pinnate . . . . .	43	Apocarpous . . . . .	125	Bracts, bractæ 60, 77, 202	
Accessory organs . . . . .	168	Aquatic = growing in water . . . . .	14	Bracteate = having bracts.	
Acicular . . . . .	54	Arboreal or arborescent plants . . . . .	12	Bracteoles . . . . .	62
Achene . . . . .	158	Aril, arillus . . . . .	164	Bristles, bristly . . . . .	173
Aculeate . . . . .	170	Arilate (having an aril) . . . . .	164	Bud . . . . .	16
Acuminate, acumen . . . . .	47	Aristate . . . . .	47	Bulb . . . . .	26
Acute . . . . .	47	Article, articulate, articulation . . . . .	54	Bush . . . . .	12
Adherent . . . . .	140, 145	Artificial divisions and characters . . . . .	184	Cæspitose = tufted . . . . .	28
Adnate . . . . .	63, 145	Ascending . . . . .	28	Callous = hardened and usually thickened.	
Adnate anther . . . . .	114	Aspalous . . . . .	85	Calycule, calyculate . . . . .	80
Adventitious . . . . .	17, 19	Assimilation . . . . .	218	Calyx . . . . .	15, 90, 93
Aerial = growing in the air.		Auricle . . . . .	49	Cambium-region . . . . .	211
Æstivation . . . . .	102	Auriculate = having auricles . . . . .	50	Campanulate . . . . .	104
Aggregate fruit . . . . .	147	Axil, axillary . . . . .	17	Campylotropous . . . . .	134
Alabastrum (bud) . . . . .	214	Axile (in the axis) . . . . .	132	Canescent . . . . .	173
Alae (wings) . . . . .	37, 155	Bark . . . . .	198	Capillary = hair-like . . . . .	54
Alate = having wings.		Barren . . . . .	85, 110	Capitate . . . . .	74
Albumen, albuminous . . . . .	162	Base . . . . .	36, 48, 115	Capsule . . . . .	158
Albuminum . . . . .	198	Bast-cells . . . . .	198	Carpel . . . . .	15, 123
Alliances . . . . .	182	Berry . . . . .	157	Carpophore . . . . .	146
Alternate . . . . .	32, 90	Bi- (2 in composition) . . . . .	44	Cartilaginous = of the consistence of cartilage or of parchment.	
Amentum = catkin . . . . .	76	Bicarpellary . . . . .	125	Caruncle, carunculate . . . . .	164
Amphitropous . . . . .	134	Bidentate . . . . .	44	Caryopsis . . . . .	160
Amplexicaul . . . . .	37	Biennials . . . . .	12	Catkus . . . . .	76
Amygdaloid = almond-like.		Bifid . . . . .	44	Cauline (on the stem) . . . . .	38
Amyloid . . . . .	192	Bifoliolate . . . . .	44	Caulocarpic . . . . .	12
Anastomose . . . . .	40	Bijugate . . . . .	44	Cells (elementary) . . . . .	186
Anatropous . . . . .	134	Bilabiate (two-lipped) . . . . .	102, 105	Cells (of anthers) . . . . .	109
Androgynous . . . . .	87	Bilocular . . . . .	126	Cells (of the ovary) . . . . .	121
Angiospermous . . . . .	161	Bipinnate . . . . .	43	Cellular system . . . . .	193
Anisomerous . . . . .	94	Bisexual . . . . .	85	Cellular tissue . . . . .	188
Annuals . . . . .	12			Cellulose . . . . .	191
Anterior . . . . .	91			Centrifugal . . . . .	72
Anther . . . . .	109, 114			Centripetal . . . . .	72
Anthesis (flowering period) . . . . .	214			Chaff . . . . .	82
Apetalous . . . . .	85				



	Par.		Par.		Par.
Chalaza . . . . .	133	Cylindrical . . . . .	54	Elaborated sap . . . . .	217
Character . . . . .	183	Cyme, cymose . . . . .	74	Elementary cells and tis-	
Chlorophyll . . . . .	132			sues . . . . .	186
Chromule . . . . .	192	Deca- or decem- (10 in		Elliptical . . . . .	45
Ciliate . . . . .	39	composition) . . . . .	44, 92	Emarginate . . . . .	47
Circumsciss . . . . .	158	Deciduous calyx . . . . .	152	Embryo . . . . .	162, 166
Cirrhus = tendril . . . . .	169	Decomound . . . . .	43	Endocarp . . . . .	157
Class . . . . .	182	Decumbent . . . . .	28	Endogens, endogenous	
Claw (of a petal) . . . . .	107	Decurrent . . . . .	37	plants . . . . .	195
Climbing stem . . . . .	29	Decussate . . . . .	32	Endogenous stem . . . . .	199
Coats of the ovule . . . . .	133	Definite . . . . .	89	Endosmose . . . . .	217
Coats of the seed . . . . .	163	Definitions . . . . .	(p. i.)	Ennea- (9 in composi-	
Coccus . . . . .	159	Dehiscence, dehiscent		tion) . . . . .	92
Cohesent . . . . .	145		118, 156	Entire . . . . .	39
Collateral = inserted one		Dentate . . . . .	39	Epicarp . . . . .	157
by the side of the		Depressed . . . . .	54	Epidermis . . . . .	173, 193
other.		Descriptive Botany . . . . .	(p. i.)	Epigynous . . . . .	140
Collection of specimens . . . . .	224	Determinate . . . . .	67	Epigynous disk . . . . .	144
Coma . . . . .	163	Determination of plants . . . . .	245	Epiphyte . . . . .	14
Common petiole . . . . .	39	Dextrine . . . . .	192	Erect . . . . .	28
Complete flower . . . . .	89	Di- (2 in composition) . . . . .	92	Exalbuminous (without	
Compound leaf . . . . .	39	Diadelphous . . . . .	113	albumen) . . . . .	162
Compound flower . . . . .	74	Diagnosis . . . . .	246	Examination of plants . . . . .	243
Compound fruit . . . . .	147	Dialypetalous . . . . .	100	Exogens, exogenous	
Compound ovary . . . . .	126	Diaudrous . . . . .	93	plants . . . . .	193
Compound umbel . . . . .	74	Dichlamydeous . . . . .	85	Exogenous stem . . . . .	198
Compressed . . . . .	54	Dichotomous . . . . .	33	Exserted . . . . .	113
Cone . . . . .	160	Diclinous . . . . .	86	Extrorse . . . . .	118
Confluent . . . . .	117	Dicotyledonous plants . . . . .	167		
Conical . . . . .	54	Didymous . . . . .	54	Falcate . . . . .	45
Connate . . . . .	145	Didynamous . . . . .	113	Families . . . . .	181
Connective, connectivum . . . . .	109	Diffuse . . . . .	28	Farinose . . . . .	173
Connivent . . . . .	145	Digitate . . . . .	41	Fascicled, fasciculate . . . . .	32
Contorted, convolute . . . . .	102	Digynous . . . . .	93, 125	Fastigiate . . . . .	74
Cordate . . . . .	49	Dimerous . . . . .	93	Fecula . . . . .	192
Cordiform . . . . .	49	Dimidiate . . . . .	117	Female . . . . .	85
Coriaceous . . . . .	55	Diœcious . . . . .	86	Fertile . . . . .	85
Corky layer . . . . .	198	Dipetalous . . . . .	93	Fibre . . . . .	18
Corm . . . . .	27	Disepalous . . . . .	93	Fibrous root . . . . .	20
Corolla . . . . .	15, 90, 97	Disk . . . . .	136	Fibro-vascular system . . . . .	193
Corrugate (crumpled) . . . . .	102	Dissepiment . . . . .	126	Filament . . . . .	109
Corymb, corymbose . . . . .	74	Dissected . . . . .	39	Filiform = thread-like.	
Costate . . . . .	173	Distichous . . . . .	32	Fimbriate = fringed.	
Cotton, cottony . . . . .	173	Distinct . . . . .	145	Flabelliform = fan-shaped . . . . .	45
Cotyledons . . . . .	166	Divaricate . . . . .	115	Fleshy . . . . .	55
Creeping . . . . .	28	Diverging, divergent . . . . .	115, 145	Floccose . . . . .	173
Crenate, crenulate . . . . .	39	Divided . . . . .	39	Floral envelope . . . . .	15
Cristate = having a crest-		Dorsal = on the back.		Floral leaves . . . . .	61
like appendage.		Double flowers . . . . .	97	Flowers . . . . .	15, 84, 213, 219
Crown of the root . . . . .	24	Down, downy . . . . .	173	Flowering plants . . . . .	10
Crumpled . . . . .	102	Drupe . . . . .	157	Foliaceous = leaf-like.	
Crustaceous . . . . .	55	Dry fruits . . . . .	158	Follicle . . . . .	159
Cryptogamous plants . . . . .	10	Ducts . . . . .	188	Foramen . . . . .	133
Culm . . . . .	34	Duramen . . . . .	198	Forked . . . . .	33
Cuneate . . . . .	45			Foveolate . . . . .	105
Cupular (cup-shaped) . . . . .	136	Ear . . . . .	76	Free . . . . .	89, 132, 140, 145
Cuspidate . . . . .	47	Echinate . . . . .	173	Fruit . . . . .	15, 146, 222

	Par.		Par.		Par.
Frutescent, fruticose . . .	12	Induplicate . . . . .	102	Mono- (1 in composition) . . . . .	92
Function . . . . .	7	Inferior . . . . .	140	Monocarpellary . . . . .	125
Funicle (funiculus) . . .	164	Inferior radicle . . . . .	167	Monocarpic . . . . .	12
Funnel-shaped . . . . .	104	Inflorescence . . . . .	66	Monochlamydeous . . . . .	85
Furrowed . . . . .	173	Infundibuliform (funnel-shaped) . . . . .	104	Monocotyledonous plants	167
Fusiform = spindle-shaped . . . . .	54	Innate anther . . . . .	114	Monococious . . . . .	86
Gamopetalous . . . . .	100	Insertion . . . . .	140	Monogynous . . . . .	125
Geminate . . . . .	32	Internode . . . . .	31	Monopetalous . . . . .	100
Genus, genera . . . . .	180	Interrupted spike or raceme . . . . .	75	Morphology . . . . .	8, 88
Germ, germination . . .	215	Introrse . . . . .	118	Mucronate . . . . .	47
Gibbous . . . . .	105	Involucre, involucl . . .	79	Multi- ( <i>many</i> , or an indefinite number, in composition) . . . . .	44
Glabrous . . . . .	173	Involute . . . . .	102	Muricate . . . . .	173
Glands . . . . .	175, 206	Irregular . . . . .	95	Naked . . . . .	85, 161
Glandular-setose . . . . .	173	Isomorous . . . . .	89	Natural divisions and characters . . . . .	184
Glaucous . . . . .	173	Joint, joining . . . . .	54	Natural Order . . . . .	181
Globose, globular . . . .	54	Jugum, juga = pairs . . .	44	Navicular = boat-shaped.	
Glochidiate . . . . .	173	Kernel . . . . .	157	Nectary . . . . .	138
Glume . . . . .	83	Knob . . . . .	25	Nerve . . . . .	40
Glutinous . . . . .	173	Labellum . . . . .	105	Net-veined . . . . .	40
Grain . . . . .	160	Laciniate . . . . .	39	Neuter . . . . .	85
Gymnospermous . . . . .	161	Lamina . . . . .	35, 107	Node . . . . .	31
Gynobasis, gynophore . .	143	Lanate = woolly . . . . .	173	Novem- (9 in composition) . . . . .	44
Habit . . . . .	183	Lanceolate . . . . .	45	Nucleus of a cell . . . . .	191
Hairs . . . . .	171, 205, 223	Lateral . . . . .	91	Nucleus of the ovule . .	133
Hastate . . . . .	50	Leaf, leaves 15, 35, 200, 218		Nut . . . . .	158
Head . . . . .	74	Leaf-bud . . . . .	16	Obcompressed . . . . .	54
Heart-wood . . . . .	198	Leaflet . . . . .	39	Obconical . . . . .	54
Hepta- (7 in composition) . . . . .	92	Leaf-opposed . . . . .	67	Obcordate . . . . .	47
Herbaceous perennials . .	12	Legume . . . . .	160	Oblate . . . . .	45
Herbarium . . . . .	224	Lepidote . . . . .	172	Oblong . . . . .	45, 54
Hernaphrodite . . . . .	85	Liber . . . . .	198, 211	Obovate . . . . .	45
Heterogamous . . . . .	87	Ligulate = strap-shaped.		Obovoid . . . . .	54
Hexa- (6 in composition) .	92	Limb . . . . .	104	Obpyramidal . . . . .	54
Hilum . . . . .	165	Linear . . . . .	45, 54	Obtuse . . . . .	47
Hirsute . . . . .	173	Lip, lipped . . . . .	105	Oct- or octo- (8 in composition) . . . . .	44, 92
Hispid . . . . .	173	Lobe, lobed . . . . .	39	Offset . . . . .	23
Hairy . . . . .	173	Loculicidal . . . . .	158	Opposite . . . . .	32
Homogamous . . . . .	87	Lower . . . . .	91	Orbicular . . . . .	45
Hooks . . . . .	169	Lunate = crescent-shaped.		Order . . . . .	181
Hybernaculum . . . . .	23	Lyrate . . . . .	41	Organ . . . . .	7
Hybrids . . . . .	247	Male . . . . .	85	Organogenesis . . . . .	213
Hypocrateriform (salver-shaped) . . . . .	104	Marcrescent . . . . .	151	Organs of vegetation and reproduction . . . . .	9
Hypogynous . . . . .	140	Mealy . . . . .	173	Orthotropous . . . . .	134
Imbricate, imbricated 58, 102		Medullary rays and sheath . . . . .	198	Oval . . . . .	45
Imparipinnate . . . . .	43	Membranous . . . . .	55	Ovary . . . . .	121
Imperfect . . . . .	84	Micropyle . . . . .	165	Ovate . . . . .	45
Incomplete . . . . .	84	Midrib . . . . .	40	Ovoid . . . . .	54
Indefinite . . . . .	92	Monadelphous . . . . .	113	Ovule . . . . .	121, 133
Indehiscent . . . . .	156	Mouandrous . . . . .	112		
Indeterminate . . . . .	67	Mouiliform . . . . .	54		
Indumentum . . . . .	171				

	Par.		Par.		Par.
Palate . . . . .	105	Pod . . . . .	158	Rhomboidal . . . . .	45
Palea, palcæ . . . . .	82	Podocarp . . . . .	120	Ribs . . . . .	40
Paleaceous = of a chaffy consistence.		Pollen . . . . .	109, 119	Ribbed . . . . .	173
Palmate . . . . .	41, 42	Poly- ( <i>many</i> , or an in- definite number, in composition) . . . . .	92	Ringent . . . . .	105
Palmatifid, palmatisect . . . . .	42	Polyadelphous . . . . .	113	Root 15, 18, 196, 207, 216	
Panicle, paniculate . . . . .	74	Polyandrous . . . . .	92, 112	Rootstock . . . . .	24
Papillæ . . . . .	122	Polygamous . . . . .	86	Rostrate = beaked.	
Pappus . . . . .	155	Polygynous . . . . .	92, 125	Rosulate . . . . .	38
Parallel veins . . . . .	40	Polypetalous . . . . .	100	Rotate . . . . .	104
Parasite . . . . .	14	Pome . . . . .	160	Rudimentary . . . . .	84
Parenchyma . . . . .	188	Posterior . . . . .	91	Rugose . . . . .	173
Parietal . . . . .	132	Præfoliation . . . . .	57	Runcinate . . . . .	41
Pectinate . . . . .	41	Preservation of speci- mens . . . . .	224	Runner . . . . .	30
Pedate . . . . .	41, 42	Prickles . . . . .	170	Saccate . . . . .	105
Pedatifid, pedatisect . . . . .	42	Primine . . . . .	133	Sagittate . . . . .	50
Pedicel . . . . .	70	Procumbent . . . . .	28	Salver-shaped . . . . .	104
Pedicellate = on a pedicel.		Proliferous . . . . .	17	Samara . . . . .	158
Peduncle . . . . .	68	Prosenchyma . . . . .	188	Sap . . . . .	192
Pedunculate = on a pe- duncle.		Prostrate . . . . .	28	Sapwood . . . . .	198
Peltate . . . . .	52	Protoplasm . . . . .	191	Sarcoarp . . . . .	157
Penicillate . . . . .	130	Pubescent, puberulent . . . . .	173	Sarmentose . . . . .	28
Penta- (5 in composition) . . . . .	92	Pulvinate (cushion- shaped) . . . . .	136	Scabrous . . . . .	173
Pepo . . . . .	160	Punctiform = like a point or dot.		Scales . . . . .	58, 59, 172, 201
Perennials . . . . .	12	Putamen . . . . .	157	Scaly bulb . . . . .	26
Perfect flower . . . . .	84	Pyramidal . . . . .	54	Scaly surface . . . . .	172
Perfoliate . . . . .	37	Pyrenes . . . . .	157	Scape . . . . .	69
Periauth . . . . .	15, 98, 202, 220	Quadri- (4 in composi- tion) . . . . .	44	Scariose, scarions . . . . .	55
Pericarp . . . . .	154	Quincuncial . . . . .	102	Scattered . . . . .	32
Perigynous . . . . .	140	Quinque- (5 in compo- sition) . . . . .	44	Scion . . . . .	30
Perisperm . . . . .	162	Quintuplinerved . . . . .	40	Scorpioid eyeme . . . . .	74
Persistent . . . . .	146	Race . . . . .	178	Section . . . . .	182
Personate . . . . .	105	Raceme, racemose . . . . .	74	Secund . . . . .	32
Petal . . . . .	90	Rachis . . . . .	39, 68	Secundine . . . . .	133
Petiole . . . . .	35	Radical . . . . .	38	Seed . . . . .	161
Petiolule . . . . .	39	Radicle . . . . .	166	Segment . . . . .	39
Phænogamous, phanero- gamous . . . . .	10	Raphe . . . . .	134	Sepals . . . . .	90
Phyllaries . . . . .	79	Raphides . . . . .	192	Septem- (7 in composi- tion) . . . . .	44
Phyllodium = a flat pe- tiole with no blade.		Receptacle . . . . .	74, 135	Septicidal . . . . .	158
Pilose . . . . .	173	Reduplicate . . . . .	102	Septum = partition . . . . .	126
Pinna . . . . .	43	Regular . . . . .	95	Serrate, serrulate . . . . .	39
Pinnate . . . . .	41, 42	Reniform . . . . .	51	Sessile . . . . .	37
Pinnatifid, pinnatisect . . . . .	42	Respinate . . . . .	105	Seta, setæ (bristles) . . . . .	173
Pistil . . . . .	15, 90, 120, 203, 221	Reticulate . . . . .	40	Setaceous (bristle-like) . . . . .	54
Pistillate . . . . .	85	Retuse . . . . .	47	Setose (bearing bristles) . . . . .	173
Pith . . . . .	198	Revolate . . . . .	102	Sex- (6 in composition) . . . . .	44
Placenta, placentation . . . . .	131	Rhachis . . . . .	39, 68	Sheathing . . . . .	37
Plant . . . . .	6	Rhaphe . . . . .	134	Shrubs . . . . .	12
Plicate . . . . .	102	Rhizome . . . . .	21, 24	Sillicule, siligna . . . . .	160
Plumose . . . . .	172			Silver grain . . . . .	198
Pumule . . . . .	166			Simple . . . . .	39
Pluri- = <i>several</i> , in com- position.				Sinuate . . . . .	39
Plurilocular . . . . .	126			Sinus . . . . .	39
				Smooth . . . . .	173
				Spadix . . . . .	76
				Spatha . . . . .	81

	Par.		Par.		Par.
Spathulate . . . . .	45	Suture . . . . .	159	Umbel, umbellate, um- bellule . . . . .	33, 74
Species . . . . .	177	Symmetrical . . . . .	89	Umbilicate . . . . .	173
Specimen . . . . .	225	Synandrous . . . . .	112	Umbonate . . . . .	173
Spherical . . . . .	54	Syncarpous . . . . .	125	Uncinate = hooked.	
Spike, spicate . . . . .	74	Syngenesious . . . . .	113	Undershrubs . . . . .	12
Spikelet . . . . .	76	Systematic Botany (p. xxiv.)		Undulate . . . . .	39
Spinous . . . . .	170			Unequally pinnate . . . . .	43
Spiral vessels . . . . .	188	Taproot . . . . .	20	Unguiculate . . . . .	107
Spur, spurred . . . . .	105	Teeth . . . . .	39, 101	Unguis (claw) . . . . .	107
Squamæ = scales . . . . .	58	Tegmen . . . . .	163	Uni- (1 in composition) . . . . .	44
Squarrose . . . . .	58	Tendril . . . . .	29, 169	Unilateral (one-sided) ra- cemes . . . . .	74
Stamens . 15, 90, 108, 203		Terete . . . . .	54	Unilocular . . . . .	126
Staminate . . . . .	85	Teruate . . . . .	32, 41	Unisexual . . . . .	86
Staminodia . . . . .	110	Terrestrial = growing on the earth . . . . .	14	Unsymmetrical . . . . .	94
Starch . . . . .	192	Testa . . . . .	163	Upper . . . . .	91
Stellate . . . . .	104	Tetra- (4 in composition) . . . . .	92	Urceolate . . . . .	104
Stellate hairs . . . . .	172	Tetradyamous . . . . .	113	Utricle . . . . .	158
Stem 15, 28, 197, 210, 217		Thorus . . . . .	170		
Stem-clasping . . . . .	37	Throat . . . . .	104	Valvate . . . . .	102
Sterile . . . . .	85	Thyrus, thyrsoïd . . . . .	74	Valves . . . . .	158
Stigma . . . . .	121	Tissues (elementary) . . . . .	186	Variety . . . . .	178
Stipella . . . . .	64	Tomentose . . . . .	173	Vascular tissue . . . . .	188
Stipes, stipitate . . . . .	65	Toothed . . . . .	39	Vegetable Anatomy . 8, 186	
Stipules . . . . .	63	Torus . . . . .	135	Vegetable Chemistry . . . . .	8
Stock . . . . .	16, 22	Trees . . . . .	12	Vegetable Homology or Metamorphosis . . . . .	88
Stole, stolon . . . . .	23, 30	Tri- (3 in composition) . . . . .	44, 92	Vegetable Physiology 8, 207	
Stomates . . . . .	194	Tribe . . . . .	182	Veins, veinlets, veuation . . . . .	40
Stone, stone-fruit . . . . .	157	Trichotomous . . . . .	33	Vernation . . . . .	57
Striate . . . . .	173	Trifid . . . . .	41	Versatile anther . . . . .	114
Strigose, strigillose . . . . .	173	Trifoliate . . . . .	41	Verticil, verticillate . . . . .	32
Strophiole, strophiolate . . . . .	164	Trigouous . . . . .	54	Vessels . . . . .	188
Style . . . . .	121	Tripinnate . . . . .	43	Virgate = twiggy . . . . .	28
Sub = <i>almost</i> , or <i>under</i> , in composition.		Triplinerved . . . . .	40	Viscid, viscous . . . . .	173
Subclass, suborder . . . . .	182	Triquetrous . . . . .	54	Vitta, vittæ . . . . .	175
Submerged = under water.		Tristichous . . . . .	32	Viviparous . . . . .	17
Subulate . . . . .	54	Truncate . . . . .	47	Voluble . . . . .	29
Succulent . . . . .	55	Trunk . . . . .	12		
Succulent fruits . . . . .	157	Tube . . . . .	101, 104	Wart, warted . . . . .	173
Sucker . . . . .	30	Tuber, tuberous . 20, 25, 204		Wavy . . . . .	39
Suffrutescent, suffruti- cose . . . . .	12	Tuberculate . . . . .	173	Worl, whorled . . . . .	32
Sugar . . . . .	192	Tubular . . . . .	104	Wing, winged . . . . .	37, 155
Sulcate . . . . .	173	Tufted . . . . .	28	Wood . . . . .	198
Superior . . . . .	140	Tunicated bulb . . . . .	27	Woody tissue . . . . .	188
Superior radicle . . . . .	167	Turbinate = top-shaped . . . . .	54	Wool, woolly . . . . .	173
Superposed = inserted one above the other.		Twincr . . . . .	29		
		Twisted . . . . .	102		
		Type, typical . . . . .	181		



## CLASSIFICATIONS OF THE ORDERS AND GENERA.

---

- I. KEY, CHIEFLY ADAPTED FROM DR. LINDLEY'S 'VEGETABLE KINGDOM.'
  - II. KEY, ACCORDING TO THE LINNÆAN CLASSES.
  - III. ARRANGEMENT AND CHARACTERS OF THE ORDERS ACCORDING TO THE NATURAL SYSTEM, AS ADOPTED IN THE PRESENT WORK.
- 

THE following Keys are intended to facilitate the student's endeavours to determine the names of New Zealand plants. I have tried to make them as simple as possible, by avoiding the use of more technical terms than necessary, and by employing in many cases characters taken from the general habit of the plants. None of these Keys can, however, be used, without some previous study of the elements of structural botany;\* for the terms employed have each an exact meaning, which cannot safely be guessed at. The amount of study required depends much upon whether the student's powers of observation and of reasoning are good and accurate; but no amount of ability will obviate the absolute necessity of observing the characters of plants carefully and accurately, and clearly understanding the application of the terms used in defining these characters; and I would remind both teachers and students, that it is now a generally received opinion, that no subject is so well suited as systematic botany, to quicken the observing powers, and to improve the reasoning faculties of the young; and I believe that a little training in the use of these Keys alone, will sharpen the intellect of the quickest to a remarkable degree, and materially improve that of the dullest.

So many New Zealand plants are variable, have minute or unisexual flowers, or are otherwise difficult of determination, that by one key alone the student may fail to find out his plant; he must then try by means of the others; but there are a few New Zealand plants, which, as it appears to me, no system of keys will enable an un instructed student to find out; just as there are idioms and expressions in languages that no grammar will teach.

All plants are naturally divisible into two great primary groups:—Flowering (Phænogamie) and Flowerless (Cryptogamic). To the first belong all

\* These can be obtained from the excellent outlines of Botany by G. Bentham, Esq., P.L.S., prefixed to this work.

such as have more or less obvious flowers, and in which fertilization is effected by pollen (shed by the stamens) falling on the stigma of the pistil, which contains the ovules, or on the ovule itself. The effect of this fertilization is, that the ovule ripens into a seed, which consists of one or more integuments enclosing an embryo or rudimentary plant. This embryo, again, consists of distinct parts, from which in germination the stem and leaves are developed upwards, and the root downwards. Cryptogamic plants have no such apparatus, no obvious flowers, no stamens nor pistil nor ovule, nor have their seeds any distinguishable integuments or embryo. Their fertilization is effected in a very different manner, by most minute organs, extremely difficult to discover; and they are propagated chiefly by minute spores, or microscopic globular or angular bodies, usually without integument, and never containing an embryo. When the spore germinates, it is by growth from any point of its surface. As a rule, all commonly recognized trees, shrubs, and herbs belong to Phænogams, or flowering plants, whilst Cryptogams include Ferns, Lycopods, Mosses, Hepaticæ, Lichens, Fungi, and Algæ; of these the Ferns and Lycopods have leaves and branches more or less resembling those of Phænogams (but never flowers); the remainder are successively less and less like flowering plants, till we arrive at some of the lowest forms of Fungi and Algæ, which are with difficulty to be distinguished from the lowest forms of animal life.

The only New Zealand Phænogam that can be mistaken for a Cryptogam is *Lemma* (p. 277); and the Cryptogams which most nearly approach Phænogams are Lycopods, which have much of the habit of miniature Conifers, and are often furnished with cones also: these resemblances are, however, mainly in appearance.

The Cryptogams are a special study of great difficulty; and it will take time and research, and the collection of many specimens, before the student can make much progress in a knowledge of any of the Cryptogamic Orders except Ferns. I confess to having found very great difficulty in so describing the plants of any Cryptogamic Orders that a student shall readily name a specimen by this book; and with regard to Fungi, and certain divisions of the other Orders, as the crustaceous Lichens, freshwater, filamentous, unicellular and other Algæ, no descriptions alone will suffice either to give the uninstructed student a general acquaintance with the subject, or to enable him to name an isolated species. To understand these plants, good magnified drawings are essential; and indeed the same may be said for all departments of Cryptogamic botany after the Lycopods. I would recommend the student who is disposed to study Mosses, Hepaticæ, Lichens, Algæ, and Fungi, to take up one of these Orders at a time, to dissect, magnify,\* and draw the organs of fructification (in all stages) of a good many species, before attempting to name any by this book. Should he have access to the 'Botany of the Antarctic Voyage,' he will find in all its parts (Antarctic Flora, Flora of New

\* For this purpose, a good "simple microscope," with powers of  $\frac{1}{2}$  in.,  $\frac{1}{4}$  in.,  $\frac{1}{10}$  in., and  $\frac{1}{20}$  in. (the 2 latter Coddington lenses), is sufficient; such may be had of Ross, optician, Featherstone Buildings, Holborn, for about £4. 10s. Triangular-pointed (glovers') needles stuck in a handle, and a small keen-edged knife (such as are used in eye-operations) are the best instruments for ordinary purposes to dissect with; they are easily sharpened on a whetstone.

Zealand, and Flora of Tasmania) figures of a vast number of New Zealand species, for very many of these are widely diffused over the southern hemisphere.

Of New Zealand flowering plants, the following are more or less remarkable for some peculiarity of habit, habitat, locality, etc.

1. More or less aquatic species will be found in the following genera and Orders :—

Ranunculus, p. 3.	Limosella, p. 204.	Isolepis, p. 301.
Montia, p. 27.	Utricularia, p. 222.	Cladium, p. 303.
Elatine, p. 28.	Typhaceæ, p. 276.	( <i>Azolla</i> , which somewhat re-
Myriophyllum, p. 66.	Naiadeæ, p. 277.	sembles a flowering plant,
Callitriche, p. 68.	Scirpus, p. 299.	is a Cryptogam.)
Hydrocotyle, p. 85.	Eleocharis, p. 300.	

2. Leafless plants, or plants provided with scale-like or very reduced leaves only, will be found in the following genera :—

Discaria, p. 43.	Salicornia, p. 233.	Junceus, p. 288.
Carmichaelia, p. 46.	Cassytha, p. 239.	Leptocarpus, p. 294.
Rubus, p. 54.	Exocarpus, p. 246.	Schœnus, p. 297.
Viscum, 108.	Dactylanthus, p. 255.	Scirpus, p. 299.
Cuscuta, p. 199.	Gastrodia, p. 263.	Eleocharis, p. 300.
Veronica (§ 4, α), p. 205.	Prasophyllum, p. 272.	Cladium, p. 301.
Utricularia, p. 222.	Lcmna, p. 277.	Lepidosperma, p. 307.

3. Parasitic plants growing on branches (exclusive of Epiphytes) :—

Loranthaceæ, p. 106.	Cuscuta, p. 199.	Cassytha, p. 239.
----------------------	------------------	-------------------

*Euphrasia*, p. 219: the English species in germination attaches itself to the roots of grasses, from which it derives its nourishment. *Santalum*, p. 247, also should be observed in a young state, for it belongs to a family of which some species are parasites.

4. Plants with milky juice :—

Microseris, p. 164.	Wahlenbergia, p. 169.	Parsonsia, p. 187 (slightly).
Crepis, p. 164.	Colensoa, p. 170.	Convolvulus, p. 197. (do.)
Taraxacum, p. 165.	Lobelia, p. 171.	Euphorbia, p. 247.
Sonchus, p. 165.	Sapota, p. 185.	Epicarpurus, p. 250.
Pieris, p. 165.		

5. The leaves, etc., of species of the following genera and Orders are aromatic, fetid, or otherwise odorous when bruised; and probably of others with which I am not acquainted :—

Drimys, p. 10.	Olearia, p. 123.	Laurineæ, p. 238.
Rutaceæ, p. 38.	Brachycome, p. 137.	Monimiaceæ, p. 239.
Myrtaceæ, p. 69.	Cotula, p. 140.	Santalum, p. 247.
Umbelliferae, p. 84.	Mentha, p. 225.	Piper, p. 254.
Araliaceæ, p. 99.	Chenopodium, p. 229.	Coniferae, p. 255.
Coprosma, p. 110.		

6. The following are *usually* sea-side genera or species (to which probably many others may be added) :—

Lepidium oleraceum, p. 14.	Tillæa moschata, p. 61.	Apium, p. 89.
Hymenanthera, p. 18.	Metrosideros tomentosa, p. 72.	Meryta, p. 104.
Spergularia rubra, p. 25.	Sicyos, p. 82.	Coprosma Baueriana, p. 112.
Linum monogynum, p. 35.	Mesembryanthemum, p. 83.	C. petiolata, p. 113.
Corynocarpus, p. 46.	Tetragonia, p. 83.	Cassinia retorta, p. 145.

Senecio laetus, p. 160.	Myoporium, p. 224.	Carumbium, p. 248.
S. odoratus, p. 160.	Plantago Brownii, p. 227.	Triglochin, p. 278.
Selliera radicans, p. 173.	Pisonia, p. 229.	Ruppia, p. 279.
Seavola gracilis, p. 173.	Cheuopodium, p. 229.	Juncus maritimus, p. 289.
Samolus, p. 185.	Suaeda, p. 231.	Scirpus maritimus, p. 300.
Sapota, p. 185.	Atriplex, p. 231.	Desmoschoenus, p. 303.
Convolvulus Soldanella, p. 198.	Salsola, p. 232.	Carex pumila, p. 315.
Vitex, p. 223.	Salicornia, p. 233.	Spinifex, p. 322.
Veronica elliptica, p. 209.	Pimelea areuaria, p. 244.	Zoysia, p. 324.
Avicennia, p. 224.	Euphorbia, p. 247.	Festuca littoralis, 341.

# I. KEY TO THE NATURAL ORDERS, ETC., OF FLOWERING PLANTS.

(Chiefly adapted from Lindley's 'Vegetable Kingdom'.)

Class I. DICOTYLEDONS. Stem, when perennial, with pith, rings of wood, and separable bark. Leaves with branching netted veins. Leaflets or lobes of the perianth 4 or 5, or multiples of 4 or 5 (in the third division the perianth is often absent or imperfect). Embryo with 2 opposite cotyledons; radicle elongating in germination.

The exceptions to each of the foregoing characters are very numerous, but a little practice, and the tact and knowledge that practice alone can give, will enable the student to decide at once whether almost any New Zealand flowering plant belongs to this or the following Class.

Class II. MONOCOTYLEDONS. Stem, when perennial, without rings of wood or separable bark; the wood-bundles being isolated and scattered, apparently promiscuously through the cellular-tissue. Leaves (never opposite in New Zealand, often sheathing at the base) with parallel veins joined by straight cross-veinlets. Leaflets or lobes of the perianth 3 or 6, rarely 4; in grasses and sedges the perianth is imperfect or 0, and the flowers enclosed in dry imbricating scales. Embryo with one cotyledon or two alternate ones; radicle not elongating in germination, but giving off root-fibres.

Palms and Cordylines are the only New Zealand trees of this class. *Rhipogonum* and *Freyinetia* the only shrubs. *Rhipogonum* and *Callixene* have somewhat netted veins.

Class III. CRYPTOGAMIA. See p. lxvi.

## CLASS I. DICOTYLEDONS.

### I. Flowers having both calyx and corolla, the latter polypetalous.

#### A. POLYANDROUS. Stamens more than 20.

##### § Ovary inferior. Leaves usually opposite.

Leaves with translucent dots. Shrubs or trees . . . . MYRTACEÆ, p. 69.

Leaves fleshy. Creeping or trailing herbs . . . . FICOIDEÆ, p. 83.

##### §§ Ovary superior.

##### † Leaves stipulate.

Carpels free. Anthers 2-celled. Leaves compound . . ROSACEÆ, p. 53.

Carpels free or combined. Anthers 1-celled. Leaves simple . . . . MALVACEÆ, p. 29.

Carpels combined. Anthers 2-celled. Leaves simple . . TILIACEÆ, p. 32.

##### †† Leaves exstipulate.

Stamens perigynous. Carpels free . . . . ROSACEÆ, p. 53.

Stamens hypogynous. Carpels free, many . . . . RANUNCULACEÆ, p. 1.

Stamens hypogynous. Carpels free, few . . . . DRIMYS, p. 10.

Stamens hypogynous. Leaves with transparent dots . . HYPERICINÆ, p. 28.

Stamens hypogynous. Leaves without dots . . . . TILIACEÆ, p. 32.



## B. OLIGANDROUS. Stamens fewer than 20.

## § Ovary inferior (or apparently so).

## † Flowers umbelled or capitate.

Herbs. Stamens 5. Fruit of 2 separable carpels . . . UMBELLIFERÆ, p. 84.

Shrubs or trees. Fruit of 2 or more combined carpels. . . ARALIACEÆ, p. 99.

Herbs. Stamens 1 or 2 . . . . . ACENÆ, p. 55.

## †† Flowers not umbelled nor capitate.

Leaves stipulate . . . . . RHAMNÆ, p. 42.

Leaves exstipulate.

## a. Style 1; stigma simple.

Petals 4, imbricate. Stamens perigynous . . . ONAGRARIÆ, p. 75.

Petals 4 or 5, valvate. Stamens epipetalous . . . LORANTHACEÆ, p. 106.

Petals 4 or 5. Stamens alternate with petals.

Cells of fruit 1-seeded . . . . . CORNÆ, p. 104.

Cells of fruit many-seeded . . . . . SAXIFRAGÆ, p. 57.

## b. Styles or stigmas 2 or more, or stigma divided.

Cells of fruit 1-seeded. Shrubs. Leaves alternate . . . GRISELINIA, p. 104.

Cells of fruit 1-seeded. Herbs . . . . . HALORAGÆ, p. 64.

Cells of fruit many-seeded . . . . . SAXIFRAGÆ, p. 57.

## §§ Ovary superior.

## † Leaves stipulate.

1. Carpels solitary, 2- or more seeded. Flowers irregular . . . LEGUMINOSÆ, p. 47.

2. Carpels several, free, 1-seeded. Flowers regular . . . ROSACEÆ, p. 53.

3. Carpels combined into a 1- or more celled ovary.

## a. Ovary 1-celled. Ovules on its walls (parietal).

Climbing shrubs . . . . . PASSIFLORÆ, p. 81.

Viscid, glandular herbs. Flowers regular . . . DROSERACE, p. 62.

Herbs or shrubs, not glandular nor climbing.

Flowers regular or irregular . . . . . VIOLARIÆ, p. 15.

## b. Ovary 1-celled. Ovules fixed to its base.

Sepals 4 or 5. Herbs. Leaves opposite . . . CARYOPHYLLÆ, p. 22.

Sepals 2. Herbs. Leaves opposite or alternate . . . PORTULACÆ, p. 26.

## c. Ovary 2- or more celled.

Stamens hypogynous. Leaves opposite (water-herbs) . . . ELATINE, p. 28.

Stamens hypogynous. Leaves alternate. Herbs . . . GERANIACEÆ, p. 35.

Stamens 5, perigynous, opposite the petals. Ovules

1 in each cell. Shrubs . . . . . RHAMNÆ, p. 42.

Stamens perigynous, 5 alternate, or 10 opposite  
and alternate with the petals. Ovules many . . . SAXIFRAGÆ, p. 57.

## †† Leaves exstipulate.

1. Carpels several, free.

Herbs. Leaves opposite. Carpels 4 or 5 . . . TILLÆ, p. 61.

Herbs. Leaves alternate. Carpels 5 or more . . . RANUNCULACEÆ, p. 1.

Shrubs or herbs. Leaves opposite, simple. Carpels

5; styles very short . . . . . CORIARIÆ, p. 46.

Tree. Leaves alternate, simple, aromatic . . . DRIMYS, p. 10.

2. Carpel solitary, 1-celled.

Tree. Stamens 5, hypogynous. Ovule 1, pendulous. . . PENNANTIA, p. 41.

Tree. Stamens 5, hypogynous. Ovules 2 or more. . . DRIMYS, p. 10.

Stamens 5, perigynous, alternating with scales. Ovule 1 . . . CORYNOCARPUS, p. 46.

Stamens 10, perigynous. Ovules 2 or more . . . LEGUMINOSÆ, p. 47.

Stamens 4-5, epipetalous . . . . . MYRSINE, p. 185.

3. Carpels combined into a 1- or more-celled ovary.

Glandular herbs. Ovary 1-celled, many-ovuled . . . DROSERA, p. 63.

Herbs, not glandular. Ovary 1-celled, many-ovuled . . . CARYOPHYLLÆ, p. 22.

Ovary 2- or more celled. Stamens hypogynous.

Herbs. Sepals 4. Stamens 6. Ovary 2-celled . . . CRUCIFERÆ, p. 10.

Shrubs and trees. Sepals 5. Stamens 5, free.

Ovary 2-5-celled . . . . . PITTOSPORUM, p. 18.

Herbs. Sepals 5. Stamens 5. Ovary 5-celled .	LINUM, p. 34.
Herbs. Sepals 5. Stamens 10. Ovary 5-celled	GERANIACEÆ, p. 35.
Ovary 3- or more celled. Stamens inserted at the base of a tumid disk, or perigynous.	
Shrubs. Leaves with transparent dots. Sepals 4 or 5. Stamens 4, 5, 8 or 10 . . . . .	RUTACEÆ, p. 38.
Shrubs and trees. Sepals 4 or 5. Stamens 4 or more. Petals lobed or cut . . . . .	TILIACEÆ, p. 32.
Trees; leaves pinnate. Sepals 4 or 5. Anthers 8-10, within a fleshy tube . . . . .	DYSOXYLUM, p. 40.
Tree; leaves with glandular serratures. Calyx 5-lobed. Stamens 5, equal . . . . .	IXERBA, p. 59.
Small herb. Calyx 5-lobed. Petals linear. Stamens 5, unequal . . . . .	STACKHOUSIA, p. 42.

## II. Flowers having both calyx and corolla, the latter monopetalous.

### § Ovary inferior.

Flowers minute, numerous, in involucrate heads . . . . .	COMPOSITÆ, p. 121.
Flowers numerous, in globose not involucrate heads . . . . .	ACÆNA, p. 55.
Flowers not collected into many-flowered heads.	
Leaves opposite and stipulate, or whorled . . . . .	RUBIACEÆ, p. 110.
Leaves alternate, exstipulate.	
Stamens 2; filaments cohering with the style . . . . .	STYLIDIEÆ, p. 166.
Stamens 5, inserted at the mouth of the corolla, alternate with its lobes . . . . .	ALSEUOSMIA, p. 109.
Stamens 5, opposite the lobes of the corolla . . . . .	SAMOLUS, p. 185.
Stamens 5, epigynous or inserted at the base of the corolla . . . . .	CAMPANULACEÆ, p. 169.

### §§ Ovary superior. Corolla regular.

#### † Ovary and fruit very deeply 2-4-lobed; lobes 1-celled, 1-seeded.

Leaves alternate. Stamens perigynous. Ovary 3-lobed .	STACKHOUSIA, p. 42.
Leaves opposite. Stamens nearly straight, epipetalous.	
Ovary 4-lobed . . . . .	LABIATÆ, p. 225.
Leaves alternate. Stamens epipetalous. Ovary 4-lobed .	BORAGINEÆ, p. 191.
Leaves alternate. Stamens epipetalous. Ovary 2-lobed .	DICHONDRA, p. 199.

#### †† Ovary not deeply lobed.

#### ‡ Leaves alternate or radical (0 in *Cuscuta* of *Convolvulaceæ*).

Ovary 1-celled. Stamens epipetalous.	
Herbs. Sepals 2 . . . . .	PORTULACEÆ, p. 26.
Shrubs; leaves with glandular dots. Sepals 4 or 5	MYRSINE, p. 183.
Herbs; leaves not dotted. Sepals 4 or 5 . . . . .	SAMOLUS, p. 185.
Ovary 2- or more celled. Stamens epipetalous.	
Minute tufted herbs. Stamens 2 . . . . .	PYGMÆA, p. 217.
Herbs. Stamens 4, filaments very long . . . . .	PLANTAGO, p. 226.
Shrub or tree. Leaves alternate . . . . .	SAPOTA, p. 185.
Leafless climbing herb . . . . .	CUSCUTA, p. 199.
Stamens 4 or 5, without alternating scales.	
Shrubs or trees. Anthers 1-celled. Ovary 5-10-celled . . . . .	ERICÆÆ, p. 173.
Climbing or trailing herbs. Anthers 2-celled.	
Ovary 2-4-celled . . . . .	CONVOLVULACEÆ, p. 197.
Erect shrubs. Corolla-lobes imbricate. Anthers 2-celled. Ovary 2-4-celled . . . . .	VERBENACEÆ, p. 223.
Erect herbs. Corolla-lobes plaited. Anthers 2-celled. Ovary 2-celled . . . . .	SOLANÆÆ, p. 200.
Stamens 6 or more. Anthers 1-celled . . . . .	MALVACEÆ, p. 29.
Ovary 5-celled. Stamens 10, hypogynous . . . . .	ERICÆÆ, p. 173.

## ‡‡ Leaves opposite. Stamens epipetalous.

- Stamens 5. Climbing shrubs . . . . . PARSONSIA, p. 187.  
 Stamens 5. Herbs, very bitter . . . . . GENTIANACEÆ, p. 189.  
 Stamens 5. Erect or prostrate shrubs . . . . . LOGANIACEÆ, p. 188.  
 Stamens 2 or 4. Herbs or shrubs . . . . . SCROPHULARINEÆ, p. 200.  
 Stamens 5. Sepals 2. Herbs . . . . . PORTULACEÆ, p. 26.

## §§§ Ovary superior. Corolla irregular, 2-lipped.

## Leaves opposite.

- Ovary 4-lobed to the base. Filaments curved downwards.  
 Herbs . . . . . LABIATÆ, p. 225.  
 Ovary 4-lobed to the base. Filaments curved upwards.  
 Shrubs or trees . . . . . VERBENACEÆ, p. 223.  
 Ovary not deeply 4-lobed.  
 Ovary 1-celled, nearly 2-celled from the 2 projecting  
 placentas . . . . . RHABDOTHAMNUS, p. 221.  
 Ovary 2-celled . . . . . SCROPHULARINEÆ, p. 200.

Leaves alternate, or 0 in some *Lentibulariææ*.

- Shrub. Stamens 4. Leaves with pellucid dots . . . MYOPORUM, p. 224.  
 Herbs. Stamens 2. Leaves linear capillary or 0 . . . UTRICULARIA, p. 222.

## III. Flowers with a single perianth or 0, the calyx or corolla or both being absent.

## § Perianth single.

## † Ovary inferior. These marked \* are all provided with a double perianth, but the calyx has so obscure a limb, that they may naturally be sought for in this division.

## a. Trees or shrubs.

- Parasitic shrubs. Leaves opposite, exstipulate . . . \*LORANTHACEÆ, p. 106.  
 Tree. Leaves opposite or alternate or 0, exstipulate.  
 Flowers hermaphrodite . . . . . SANTALUM, p. 247.  
 Tree. Leaves alternate, exstipulate, very large, long-petioled. Flowers capitate, unisexual . . . MERYTA, p. 104.  
 Trees. Leaves alternate, stipulate. Flowers unisexual . . . FAGUS, p. 249.  
 Shrub. Leaves alternate, small, stipulate . . . POMADERRIS, p. 43.

## β. Herbs (flowers unisexual in all).

- Prostrate or climbing, with tendrils . . . . . \*SICYOS, p. 82.  
 Aquatic. Leaves opposite or whorled . . . . . HALORAGÆ, p. 64.  
 Scapigerous. Leaves radical. Flowers unisexual . . . \*GUNNERA, p. 67.  
 Tuberous root parasite. Stems or scapes scaly . . . DACTYLANTHUS, p. 255.

## †† Ovary superior.

## a. Leaves stipulate.

- Spiny shrub or tree, often leafless. Calyx valvate . . . DISCARIA, p. 43.  
 Herbs and shrubs. Stipules membranous, sheathing the stem . . . . . POLYGONÆ, p. 235.  
 Herbs and shrubs. Stipules free. Flowers unisexual . . . URTICÆ, p. 250.  
 Tree. Stipules free. Flowers unisexual. Stamens 6 or more . . . . . CARUMBUM, p. 248.

## β. Leaves exstipulate.

## 1. Carpels many, free.

- Stamens hypogynous . . . . . RANUNCULACEÆ, p. 1.  
 Stamens perigynous . . . . . MONIMIACEÆ, p. 239.

## 2. Carpels solitary or ovary 1-celled.

## Leaves 0.

- Fleshy, jointed, maritime herb . . . . . SALICORNIA, p. 233.  
 Twining, slender, parasitic herb . . . . . CASSYTHA, p. 239.  
 Small shrub. Branches grooved. Fruit red . . . EXOCARPUS, p. 246.

## Leaves opposite.

## Trees or shrubs. Leaves opposite and alternate.

- Stamens 4 or 5 . . . . . SANTALUM, p. 247.

- Herbs. Flowers hermaphrodite, minute, white,  
in axillary fascicles. . . . . ALTERNANTHERA, p. 234.
- Herbs. Flowers hermaphrodite, minute, green,  
in axillary spikelets . . . . . CHENOPODIUM, p. 229.
- Herbs. Flowers unisexual, minute, green. Sta-  
mens 4, opposite perianth-lobes . . . . . PARIETARIA, p. 252.
- Herbs. Flowers hermaphrodite. Stamens 4 or  
5, alternate with perianth-lobes. Ovules many . . . . . CARYOPHYLLÆ, p. 22.
- Herbs. Flowers hermaphrodite. Stamen 1. Seed 1  
Leaves alternate. . . . . SCLERANTHUS, p. 234.
- Shrubs or trees.
- Leaves large, long petioled. Stamens 6-10,  
hypogynous . . . . . PISONIA, p. 229.
- Leaves opposite and alternate. Stamens 4 or  
5 at the base of deciduous perianth-lobes . . . . . SANTALUM, p. 247.
- Leaves without transparent dots. Stamens 4,  
on middle or top of deciduous perianth-lobes . . . . . PROTEACEÆ, p. 240.
- Leaves with transparent dots. Stamens 4 or 5,  
on base of perianth-lobes . . . . . MYRSINE, p. 183.
- Bark tough. Stamens 2-4, on top of perianth-  
tube . . . . . THYMELEÆ, p. 241.
- Stamens 6-15, perigynous. Anthers with up-  
turned valves . . . . . LAURINEÆ, p. 238.
- Tree. Leaves pinnate. Flowers unisexual. Sta-  
mens 6-8. . . . . ALECTRYON, p. 45.
- Flowers minute, green. Perianth 4- or 5-partite . . . . . CHENOPODIACEÆ, p. 229.
3. Ovary 2- or 3-celled.
- Herb, juice milky. Leaves alternate . . . . . EUPHORBIA, p. 247.
- Shrubs or trees. Leaves opposite. Stamens 2 . . . . . OLEA, p. 186.
- Shrubs or trees. Leaves alternate. Stamens 4, on  
perianth segments . . . . . PROTEACEÆ, p. 240.
- Spinous shrub or tree. Leaves opposite or 0. Sta-  
mens 4 or 5, perigynous . . . . . DISCARIA, p. 43.
- Rigid shrub. Leaves alternate. Stamens 5, hypo-  
gynous . . . . . *Pittosporum rigidum*, p. 20.
- Tree. Leaves alternate. Flowers unisexual. Sta-  
mens 6-8 . . . . . DODONÆA, p. 44.
- Herbs. Sepals 4. Stamens 6 . . . . . CRUCIFERÆ, p. 10.
- §§ Perianth wholly wanting.
- † Leaves opposite, serrate, stipulate . . . . . ASCARINA, p. 253.
- Leaves opposite, exstipulate. Stamen 1. Water-herb . . . . . CALLITRICHE, p. 68.
- Leaves alternate. Juice milky. Maritime herb . . . . . EUPHORBIA, p. 247.
- Leaves alternate, very aromatic. Shrub . . . . . PIPER, p. 254.
- Leaves alternate, fleshy. Spikes slender. Herb . . . . . PEPEROMIA, p. 254.
- Leaves reduced to scales. Root-parasite . . . . . DACTYLANTHUS, p. 255.
- Leaves various, very coriaceous, or minute imbricating scales.
- Trees and shrubs . . . . . CONIFERÆ, p. 255.

## CLASS II. MONOCOTYLEDONS.

- § Perianth superior, of 6 leaflets in 2 rows.
- Flowers very irregular. Anther 1, adnate to the style . . . . . ORCHIDÆ, p. 260.
- Flowers regular. Stamens 3 . . . . . LIBERTIA, p. 274.
- Flowers regular. Stamens 6 . . . . . HYPOXIS, p. 275.
- §§ Perianth inferior; segments petaloid or herbaceous.
- Perianth petaloid. Fruit a 1-3-celled, 3- or more seeded  
berry or capsule . . . . . LILIACEÆ, p. 280.
- Perianth herbaceous. Fruit a 1-seeded drupe . . . . . ARECA, p. 288.
- Perianth herbaceous. Fruit of 3, 4, or 6 1-seeded, free or  
connate carpels . . . . . NAIADÆ, p. 277.



- §§§ Perianth inferior, of 6 dry glumaceous leaflets.  
 Flowers paniced or capitate. Anthers 2-celled. Capsule  
 3-valved . . . . . JUNCÆ, p. 288.  
 Flowers in the axils of glumes, disposed in spikelets. An-  
 thers 1-celled. Fruit a nut or 1-3-celled capsular utricle . . . . . RESTIACEÆ, p. 293.
- §§§§ Perianth 0 or incomplete.
- α. Flowers in dense heads or cylindric catkins or spikes.  
 Climbing, shrubby. Leaves long, prickly . . . . . FREYCINETIA, p. 275.  
 Erect, water or marsh plants. Heads spherical . . . . . SPARGANIUM, p. 276.  
 Erect, water or marsh plants. Catkins cylindric . . . . . TYPHA, p. 276.  
 Floating or submerged water-plants . . . . . NAIADÆ, p. 277.
- β. Flowers spiked or axillary and solitary.  
 Water-herbs of various habit . . . . . NAIADÆ, p. 277.  
 Rush-like plants. Anthers 1-celled . . . . . RESTIACEÆ, p. 293.
- γ. Flowers in the axils of imbricating glumes, arranged in  
 spikelets.  
 Perianth 0, or of 6 small leaflets. Anthers 1-celled . . . . . RESTIACEÆ, p. 293.  
 Perianth 0, or of minute scales or bristles. Anther 2-  
 celled. Stems solid. Leaf-sheaths closed . . . . . CYPERACEÆ, p. 296.  
 Perianth 0, or of 1-3 most minute scales. Stamens  
 usually 3, 2-celled. Stems hollow, jointed. Leaf-  
 sheaths split to the base . . . . . GRAMINEÆ, p. 317.

CLASS III. CRYPTOGRAMS. *See p. lxi.*II. KEY TO THE GENERA OF NEW ZEALAND FLOWERING PLANTS,  
ARRANGED UNDER THE LINNÆAN CLASSES.

The Linnæan Classes are :—

1. *Flowers perfect, having stamens in the same flower with the pistils.*

- Class I. MONANDRIA . . . 1 stamen in each flower.
- II. DIANDRIA . . . 2 stamens, free from one another.
- III. TRIANDRIA . . . 3 stamens, free from one another.
- IV. TETRANDRIA . . . 4 stamens, free, equal in height.
- V. PENTANDRIA . . . 5 stamens, free.
- VI. HEXANDRIA . . . 6 stamens, free, equal in height.
- VII. HEPTANDRIA . . . 7 stamens, free.
- VIII. OCTANDRIA . . . 8 stamens, free.
- IX. ENNEANDRIA . . . 9 stamens, free.
- X. DECANDRIA . . . 10 stamens, free.
- XI. DODECANDRIA . . . 12 to 19 stamens, free.
- XII. ICOSANDRIA . . . 20 or more stamens on the calyx (perigynous).
- XIII. POLYANDRIA . . . 20 or more stamens on the receptacle (hypogynous).
- XIV. DIDYNAMIA . . . 4 stamens, 2 long and 2 short.
- XV. TETRADYNAMIA . . . 6 stamens, 4 long and 2 short.
- XVI. MONADELPHIA . . . Filaments united into 1 set at the base or higher.
- XVII. DIADELPHIA . . . Filaments united into 2 sets, usually 9 united and  
 1 free (*Leguminosæ*).
- XVIII. POLYADELPHIA . . . Filaments united into 3 or more sets.

XIX. SYNGENESIA . . Anthers united, but filaments free.

XX. GYNANDRIA . . Stamens and style consolidated.

2. *Stamens and pistils usually in different flowers.*

XXI. MONŒCIA . . . Male and female flowers on one plant.

XXII. DIŒCIA . . . . Male and female flowers on different plants.

XXIII. POLYGAMIA . . Male and female flowers separate or together, and flowers sometimes hermaphrodite.

XXIV. CRYPTOGRAMIA . Fructification concealed.

### CLASS I. MONANDRIA.

Tufted herb. Leaves opposite, subulate . . . . . SCLERANTHUS, p. 234.  
 Water herb. Leaves opposite . . . . . CALLITRICHE, p. 68.  
 Leafless, fleshy, jointed, seaside herb . . . . . SALICORNIA, p. 233.  
 Small alpine herb. Leaves subulate, alternate . . . . . ALEPYRUM, p. 295.  
 Minute, floating, green, scale-like fronds . . . . . LEMNA, p. 277.  
 Prostrate herbs. Leaves pinnate. Flowers in a globose head . ACÆNA, p. 55.

Besides the above, *Orchideæ* (see XX.) are usually monandrous, but the anther is adnate to the style, and a few *Cyperaceæ* and species of *Chenopodium* have sometimes but one stamen.

### CLASS II. DIANDRIA.

§ Perianth inferior, double.

Ovary 1-celled. Flowers irregular . . . . . UTRICULARIA, p. 222.

Ovary 2-celled. Flowers regular or irregular . . . . SCROPHULARINÆ, p. 200.

§§ Perianth inferior, single.

Trees. Leaves opposite . . . . . OLEA, p. 186.

Shrubs; bark tough. Leaves alternate . . . . . PIMELEA, p. 242.

Tufted herbs. Leaves subulate . . . . . GAIMARDIA, p. 295.

Erect herbs. Leaves alternate or opposite . . . . . CHENOPODIUM, p. 229.

Prostrate herbs. Leaves pinnate. Flowers capitate . . ACÆNA, p. 55.

§§§ Perianth 0. Herb. Leaves alternate . . . . . PEPEROMIA, p. 254.

Perianth 0. Shrub, aromatic. Leaves alternate . . . PIPER, p. 254.

§§§§ Perianth superior.

Tufted herb. Leaves imbricate. Flowers solitary . . . DONATIA, p. 58.

Prostrate herbs. Leaves pinnate. Flowers capitate . . ACÆNA, p. 55.

Herb. Leaves simple, radical. Flowers spiked or paniced . GUNNERA, p. 67.

(See *Lemna* and *Salicornia* in I., *Forstera* and *Helophyllum* in XX.)

### CLASS III. TRIANDRIA..

§ 1. Flowers in spikelets. Perianth incomplete or 0.—Grasses, sedges, etc. Leaves sheathing

Stem terete, hollow. Sheaths split to the base. Anthers 2-celled, versatile . . . . . GRAMINÆ, p. 317.

Stem solid, often 3-gonous. Sheaths not split. Anthers 2-celled, adnate . . . . . CYPERACEÆ, p. 296.

Stem solid, terete. Sheaths entire. Anthers 1-celled . . RESTIACÆ, p. 293.

§ 2. Flowers in globose, peduncled heads. Leaves pinnate . . ACÆNA, p. 55.

§ 3. Flowers not in spikelets nor heads. Perianth single.

Herbs. Perianth superior, of 6 spreading pieces . . . LIBERTIA, p. 274.

Tree. Perianth superior. Calyx-limb 5-9-lobed . . . MERYTA, p. 104.

Herbs. Perianth inferior, of 5 green leaflets . . . . . CHENOPODIUM, p. 229.

§ 4. Flowers various. Perianth double.

Herb. Leaves opposite. Sepals and petals 3 or 4, inferior ELATINE, p. 28.

Herb. Leaves opposite. Sepals 2. Petals 5, inferior . . MONTIA, p. 27.

Herb. Leaves linear, imbricate. Stamens 2 or 3, epigynous DONATIA, p. 58.

Herbs. Leaves radical. Stamens 2 or 3, epigynous . . GUNNERA, p. 67.

CLASS IV. TETRANDRIA.

§ 1. Perianth double, inferior. Corolla monopetalous.

*Leaves opposite.*

Maritime tree. Leaves entire, downy below . . . . .	AVICENNIA, p. 224.
Marsh or water, minute herbs . . . . .	GLOSSOSTIGMA, p. 203.
	LIMOSELLA, p. 204.
Herb very aromatic, prostrate. Ovary 4-lobed . . . . .	MENTHA, p. 225.
Herbs. Leaves densely 4-fariously imbricate . . . . .	LOGANIA, p. 188.
Herbs, bitter. Corolla campanulate or rotate . . . . .	GENTIANEE, p. 189.

*Leaves alternate or radical.*

Shrubs. Leaves entire, with transparent dots. Stamens opposite petals . . . . .	MYRSINE, p. 183.
Tree. Stamens epipetalous, alternating with scales . . . .	SAPOTA, p. 185.
Shrub. Leaves serrate, with transparent dots . . . . .	MYOPORUM, p. 224.
Scapigerous herbs. Flowers spiked or capitate. Filaments very long, flexuose . . . . .	PLANTAGO, p. 226.

§ 2. Perianth double, inferior. Corolla polypetalous.

*Leaves opposite.*

Small herbs . . . . . TILLÆA, p. 61.  
Shrubs and trees. Petals lobed . . . . . ARISTOTELIA, p. 33.

*Leaves alternate or radical.*

Shrubs or herbs. Flowers white, small, racemed . . . . .	LEPIDIUM, p. 13.
Shrubs. Leaves with transparent dots . . . . .	MYRSINE, p. 183.
Climbing shrub. Flowers with a fringe inside the petals	PASSIFLORA, 81.
Herbs. Leaves with glandular hairs . . . . .	DROSERA, p. 63.

§ 3. Perianth double, superior. Corolla monopetalous.

Leaves opposite; stipules 0. Style 1 . . . . .	LORANTHACEÆ, p. 107.
Leaves opposite, stipuled. Styles 2 . . . . .	RUBIACEÆ, p. 110.
Leaves alternate; stipules 0. Style 1 . . . . .	ALBUOSMIA, p. 109.
Leaves whorled . . . . .	{ ASPERULA, 121.
	{ GALIUM, 120.
Leaves 0. Stems jointed. Parasites . . . . .	VISCUM, p. 103.

§ 4. Perianth double, superior. Corolla polypetalous.

Herbs. Flowers minute . . . . .	HALORAGACEÆ, p. 64.
Parasitic shrub . . . . .	LORANTHUS, p. 106.

§ 5. Perianth single or 0.

*Leaves opposite (or 0 in Discaria and Viscum).*

Herbs. Leaves subulate . . . . .	COLOBANTHUS, p. 24.
Tree or shrub, spiny. Branches opposite . . . . .	DISCARIA, p. 43.
Parasitic shrubs. Stamens opposite perianth . . . . .	<div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">TUPEIA, p. 108.</div> <div style="display: inline-block; vertical-align: middle; font-size: 2em; margin: 0 5px;">}</div> <div style="display: inline-block; vertical-align: middle;">VISCUM, p. 108.</div> </div>
Erect tree. Stamens opposite perianth-lobes . . . . .	SANTALUM, p. 247.
Herbs. Leaves broad. Flowers small, green, clustered . . . . .	CHENOPODIUM, p. 229.

*Leaves alternate.*

a. Perianth inferior.

Dr. J. A. Drake, 1892.

Trees and shrubs. Stamens on the 4 lobes of the perianth . . . . .	PROTEACEÆ, p. 240.
Herbs. Flowers minute, green . . . . .	CHENOPODIUM, p. 229.
Aquatic herbs. Leaves floating or submerged . . . . .	NAIADÆ, p. 277.
Tall, grass-like plants. Flowers in spikelets . . . . .	GRAMINÆ, p. 305.

β. Perianth superior.

Prostrate herb. Leaves pinnate. Flowers in a glo- bose head . . . . .	ACENA, p. 55.
Fleshy maritime herbs. Leaves simple . . . . .	TETRAGONIA, p. 83.
Erect tree. Flowers cymosé . . . . .	SANTALUM, p. 247.

## CLASS V. PENTANDRIA.

## § 1. Perianth, double, inferior. Corolla monopetalous.

*Leaves opposite.*

- Herbs. Sepals 2. Petals united at the base only . . . PORTULACÆ, p. 26.  
 Herbs, bitter. Calyx 4- or 5-cleft. Corolla campanulate . . . GENTIANÆ, p. 189.  
 Prostrate small shrubs. Leaves connate or stipulate . . . LOGANIACÆ, p. 188.  
 Climbing shrubs. Leaves exstipulate . . . PARSONSIA, p. 187.  
 Erect tree. Stamens alternating with scales . . . SAPOTA, p. 185.

*Leaves alternate.*

- Shrubs. Stamens epipetalous, anthers 1-celled . . . ERICÆ, p. 173.  
 Shrubs. Leaves with transparent dots. Stamens opposite corolla-lobes . . . MYRSINE, p. 183.  
 Herb. Leaves linear, not dotted. Stamens opposite corolla-lobes . . . SAMOLUS, p. 185.  
 Climbing herbs. Corolla plicate. Ovary not lobed, 2-celled . . . CONVULVULACÆ, p. 197.  
 Herbs. Peduncles supra-axillary. Berry 2-celled . . . SOLANÆ, p. 200.  
 Hispid herbs. Ovary 4-lobed. Fruit of 4 little nuts . . . BORAGINÆ, p. 191.  
 Minute, glabrous herb. Ovary 2- or 3-lobed . . . STACKHOUSIA, p. 42.  
 Climbing slender herb . . . CUSCUTA, p. 199.

## § 2. Perianth double, inferior. Corolla polypetalous.

*Leaves opposite.*

- Herbs. Sepals 5. Ovary 1-celled . . . CARYOPHYLLÆ, p. 22.  
 Herbs. Sepals 2. Ovary 1-celled . . . PORTULACÆ, p. 26.  
 Shrub. Sepals 5. Ovary 3-celled . . . ARISTOTELIA, p. 33.  
 Herb. Sepals 5. Ovary 5-celled . . . PELARGONIUM, p. 37

*Leaves alternate or radical.*

- Herbs. Leaves radical, glandular. Ovary 1-celled . . . DROSERA, p. 63.  
 Herbs. Leaves subulate, glabrous. Ovaries free . . . MYOSURUS, p. 3.  
 Herb. Leaves linear, glabrous. Ovary 5-celled . . . LINUM, p. 34.  
 Minute herb. Leaves linear, glabrous. Ovary 3-celled . . . STACKHOUSIA, p. 42.  
 Shrubs. Leaves with transparent dots . . . MYRSINE, p. 183.  
 Shrubs and trees. Ovary 2-celled . . . PITTOSPORUM, p. 18.  
 Shrubs and trees. Stamens short. Ovary 1-celled; ovules several . . . MELICYTUS, p. 17.  
 Tree. Stamens long, without alternate scales. Ovary 1-celled; ovule 1 . . . PENNANTIA, p. 41.  
 Tree. Stamens short, with alternating scales. Ovary 1-celled; ovule 1 . . . CORYNOCARPUS, p. 46.  
 Tree. Stamens long. Ovary 5-celled; ovules few . . . IXERBA, p. 59.

## § 3. Perianth double, superior. Corolla monopetalous. (Leaves always alternate.)

- Herb. Corolla regular. Stamens opposite corolla-lobes . . . SAMOLUS, p. 185.  
 Herbs. Corolla regular or irregular. Stamens alternate with corolla-lobes . . . CAMPANULACÆ, p. 169.  
 Shrubs. Corolla regular. Stamens alternate with corolla-lobes . . . ALSEUOSMIA, p. 109.

## § 4. Perianth double, superior. Corolla polypetalous. (Leaves always alternate.)

- Shrubs or trees. Flowers cymose. Ovary-cells many-ovuled . . . SAXIFRAGÆ, p. 57.  
 Shrubs or trees. Flowers umbelled. Ovary-cells 1-ovuled . . . ARALIACÆ, p. 99.  
 Shrubs. Leaves exstipulate. Flowers solitary or few. Ovary-cells 1-ovuled . . . CORNÆ, p. 104.  
 Shrubs. Leaves stipulate. Stamens opposite petals. Ovary-cells 3, 1-ovuled . . . POMADERIS, p. 43.  
 Herbs. Flowers umbelled. Ovary-cells 2, 1-ovuled . . . UMBELLIFERÆ, p. 84.



- § 5. Perianth single, inferior.  
 Herbs. Leaves opposite, exstipulate . . . . . CARYOPHYLLÆ, p. 22.  
 Herb. Leaves opposite, stipulate. Flowers small, white . . . . . ALTERNANTHERA, p. 234.  
 Herb. Leaves subulate, radical . . . . . MYOSURUS, p. 3.  
 Herbs. Leaves cauline. Flowers small, clustered, green . . . . . CHENOPODIUM, p. 229.  
 Shrub, spiny. Leaves or branches opposite . . . . . DISCARIA, p. 43.  
 Shrub. Leaves alternate . . . . . *Pittosporum rigidum*, p. 20.
- § 6. Perianth single, superior.  
 Shrub. Leaves stipulate . . . . . POMADERIS, p. 43.  
 Tree. Leaves very broad. Flowers capitate . . . . . MERYTA, p. 104.  
 Tree. Leaves opposite and alternate. Flowers cymose . . . . . SANTALUM, p. 247.  
 Herbs. Leaves alternate, fleshy . . . . . TETRAGONIA, p. 83.

## CLASS VI. HEXANDRIA.

- § 1. Perianth double, or, if single, of 6 pieces, inferior.  
 Herbs or shrubs. Perianth of 6 pieces. Style 1 . . . . . LILIACEÆ, p. 280.  
 Marsh herb. Perianth small, green, of 6 pieces. Styles 3  
 or 6 . . . . . TRIGLOCHIN, p. 278.  
 Rushes. Perianth small, of 6 dry leaflets. Stigmas 3 . . . . . JUNCEÆ, p. 288.  
 Climbing shrubs, with opposite compound leaves . . . . . CLEMATIS, p. 1.  
 Herbs and shrubs. Leaves alternate; stipules sheathing . . . . . POLYGONÆ, p. 235.  
 Shrub. Leaves opposite. Petals 4, lobed . . . . . ARISTOTELIA, p. 33.
- § 2. Perianth double, superior . . . . . CARPODETUS, p. 59.
- § 3. Perianth single or 0.  
 Tree. Leaves large, broad. Flowers capitate . . . . . MERYTA, p. 104.  
 Herb. Leaves radical, linear. Flower small . . . . . MYOSURUS, p. 3.  
 Climbing shrubs, with opposite leaves . . . . . CLEMATIS, p. 1.  
 Succulent herbs. Leaves alternate . . . . . TETRAGONIA, p. 83.  
 Tree. Leaves opposite and alternate. Flowers small, cymose . . . . . SANTALUM, p. 247.  
 Herbs and shrubs. Leaves alternate. Stipules sheathing . . . . . POLYGONÆ, p. 235.  
 Grass-like tall sedge, with harsh cutting foliage . . . . . GAHNIA, p. 305.

## CLASS VII. HEPTANDRIA.

*Pisonia* (see Class XVI.) is the only usually heptandrous New Zealand plant, but some few other genera, with indefinite stamens, are occasionally so.

## CLASS VIII. OCTANDRIA.

- § 1. Perianth double, inferior. Corolla polypetalous.  
 Shrubs or trees. Leaves opposite, simple or pinnate . . . . . WEINMANNIA, p. 60.  
 Tree, aromatic. Leaves alternate, simple . . . . . DRIMYS, p. 10.  
 Shrubs. Leaves with pellucid dots . . . . . RUTACEÆ, p. 38.
- § 2. Perianth double, superior. Corolla polypetalous.  
 Ovary 4-celled, many-ovuled . . . . . ONAGRARIÆ, p. 75.  
 Ovary 2-4-celled; cells 1-ovuled . . . . . HALORAGÆ, p. 64.
- § 3. Perianth single, inferior.  
 Climbing shrubs. Leaves opposite, compound . . . . . CLEMATIS, p. 1.  
 Herbs or shrubs. Leaves alternate . . . . . POLYGONÆ, p. 235.  
 Tree. Leaves pinnate . . . . . ALECTRYON, p. 45.
- § 4. Perianth single, superior.  
 Prostrate or climbing, fleshy herb . . . . . TETRAGONIA, p. 83.  
 Shrub or tree. Leaves membranous . . . . . FUCHSIA, p. 75.

## CLASS IX. ENNEANDRIA.

A very few New Zealand plants, with indefinite stamens, are occasionally enneandrous.

## CLASS X. DECANDRIA.

Stamens 10, free, in the same flower with the pistil. (Perianth inferior in all.)

- § 1. Perianth double. Corolla monopetalous.
- |                                 |                       |
|---------------------------------|-----------------------|
| Shrub. Ovary 5-celled . . . . . | { GAULTHERIA, p. 174. |
|                                 | { PERNETTYA, p. 176.  |
- § 2. Perianth double. Corolla polypetalous.
- Leaves opposite.*
- |  |                     |
|--|---------------------|
| Herbs. Leaves entire, exstipulate. Ovary 1-celled . .    | CARYOPHYLLÆ, p. 22. |
| Herbs and shrubs. Leaves entire, exstipulate. Carpels 5. | CORIARIA, p. 46.    |
| Herbs. Leaves lobed, stipulate . . . . .                 | GERANIACEÆ, p. 35.  |
| Shrubs or tree. Leaves compound or simple . . . .        | SAXIFRAGÆ, p. 57.   |
- Leaves alternate or fascicled.*
- |   |                   |
|---|-------------------|
| Shrubs or trees. Leaves pinnate. Flowers yellow . . | SOPHORA, p. 52.   |
| Herbs, acid. Leaves 3-foliolate . . . . .           | OXALIS, p. 38.    |
| Tree. Leaves oblong, not dotted; aromatic . . . .   | DRIMYS, p. 10.    |
| Shrub. Leaves linear, with pellucid dots . . . .    | PHEBALIUM, p. 39. |
| Herbs. Leaves lobed or cut . . . . .                | GERANIUM, p. 35.  |
- § 3. Perianth single, inferior . . . . . CLEMATIS, p. 1.

CLASS XI. DODECANDRIA. These will be found in the two following Classes.

CLASS XII. ICOSANDRIA. (Including dodecandrous perigynous plants.)

- § 1. Perianth superior.
- |  |                          |
|--|--------------------------|
| Shrubs or trees. Leaves with pellucid dots . . . . | MYRTACEÆ, p. 69.         |
| Maritime herb. Leaves opposite, very fleshy . . .  | MESEMBRYANTHEMUM, p. 83. |
- § 2. Perianth inferior.
- |   |                   |
|---|-------------------|
| Leaves compound. Carpels many, distinct . . . .   | ROSACEÆ, p. 53.   |
| Leaves simple. Ovary 1-celled, 1-ovuled . . . . . | LAURINEÆ, p. 238. |

CLASS XIII. POLYANDRIA. Perianth inferior in all. (Including dodecandrous hypogynous plants.)

- |  |                     |
|--|---------------------|
| Herbs or climbing shrubs. Carpels many, distinct . . | RANUNCULACEÆ, p. 1. |
| Herbs. Carpels 5, cohering. Styles 5 . . . . .       | HYPERICUM, p. 28.   |
| Trees and shrubs. Ovary 3-6-celled . . . . .         | TILIACEÆ, p. 32.    |
| Maritime herb with milky juice . . . . .             | EUPHORBIA, p. 247.  |

CLASS XIV. DIDYNAMIA. (Perianth inferior and irregular in all.)

- |                                |                |
|--------------------------------|----------------|
| Leaves 3-5-foliolate . . . . . | VITEX, p. 223. |
|--------------------------------|----------------|
- Leaves simple.
- |  |                         |
|--|-------------------------|
| Ovary not lobed, 2-celled, many-ovuled . . . . . | SCROPHULARINEÆ, p. 200. |
| Ovary not lobed, 1-celled, many-ovuled . . . . . | RHABDOTHAMNUS, p. 221.  |
| Ovary 4-lobed. Stamens curved downwards . . . .  | SCUTELLARIA, p. 226.    |
| Ovary 4-lobed. Stamens curved upwards . . . . .  | TEUCRIDIIUM, p. 224.    |
| Ovary 4-lobed. Stamens nearly straight . . . . . | MENTHA, p. 225.         |

## CLASS XV. TETRADYNAMIA.

Herbs. Leaves alternate or radical . . . . .	CRUCIFERÆ, p. 10.
--	-------------------

CLASSES XVI.—XVIII. MONADELPHIA, DIADELPHIA, AND POLYADELPHIA.

- § 1. Perianth double. Corolla polypetalous, or petals united at the base only. Ovary superior.
- Leaves opposite.*
- |   |                   |
|---|-------------------|
| Herbs. Leaves quite entire, exstipulate, with pellucid dots | HYPERICUM, p. 28. |
|---|-------------------|

- Herbs. Leaves lobed, stipulate, without dots . . . GERANIUM, p. 35.  
*Leaves alternate or 0 in Carmichaelia.*  
 Herbs, shrubs, and trees; bark tough. Anthers 1-celled . MALVACEÆ, p. 29.  
 Herbs, acid. Leaves 3-foliolate . . . . . OXALIS, p. 38.  
 Herb or undershrub. Leaves simple, entire . . . . . LINUM, p. 34.  
 Tree. Leaves pinnate. Flowers regular, racemed . . . DYSOXYLUM, p. 40.  
 Herbs and shrubs. Leaves 0, or pinnate or 3-foliolate.  
   Flower irregular . . . . . LEGUMINOSÆ, p. 47.  
 Herbs. Leaves lobed, stipuled . . . . . GERANIACEÆ, p. 35.  
 § 2. Perianth single.  
   Spiny maritime undershrub . . . . . SALSOLA, p. 232.  
   Herb. Leaves opposite, stipulate. Flower small, white . ALTERNANTHERA, p. 234.  
   Tree. Leaves very large . . . . . PISONIA, p. 229.

## CLASS XIX. SYNGENESIA.

- Flowers small, collected in involucrate heads . . . . . COMPOSITEÆ, p. 121.  
 Flowers not collected in involucrate heads.  
   Shrub. Leaves opposite. Corolla 2-labiate, inferior . . RHABDOTHAMNUS, p. 221.  
   Twining shrub. Leaves opposite. Corolla regular. Stamens  
     epipetalous . . . . . PARSONSIA, p. 187.  
   Shrubs and herbs. Leaves alternate, stipulate. Stamens hypogynous . . . . . VIOLARIÆÆ, p. 15.  
   Shrubs and herbs. Leaves alternate. Stamens epigynous or  
     epipetalous . . . . . CAMPANULACEÆ, p. 169.

## CLASS XX. GYNANDRIA.

- Herbs. Perianth irregular, superior. Anther 1 . . . . . ORCHIDÆÆ, p. 260.  
 Herbs. Perianth regular or irregular, superior. Anthers 2 . . STYLIDIÆÆ, p. 166.  
 Shrubs, twining. Perianth regular, inferior. Anthers 5 . . . PARSONSIA, p. 187.

## CLASSES XXI.—XXIII.

- § 1. Perianth double, inferior. Corolla monopetalous.  
   Tree. Leaves alternate. Stamens 4 or 5, alternating with  
     scales . . . . . SAPOTA, p. 185.  
 § 2. Perianth double, inferior. Corolla polypetalous.  
   Tree. Leaves opposite, pinnate . . . . . ACKAMA, p. 60.  
   Shrubs or trees. Leaves opposite, simple . . . . . ARISTOTELIA, p. 33.  
   Climbing prickly shrub. Leaves opposite, 3-5-foliolate . . RUBUS, p. 54.  
   Shrubs and trees. Ovary 2- or 3-celled, many-ovuled . . . PITTOSPORUM, p. 19.  
   Tree. Ovary 1-celled, 1-ovuled . . . . . PENNANTIA, p. 41.  
 § 3. Perianth double, superior. Corolla monopetalous.  
   *Leaves opposite or whorled.*  
     Leaves opposite, stipuled or whorled (not aquatic) . . . RUBIACEÆ, p. 110.  
     Leaves opposite or whorled. Aquatic herbs . . . . . MYRIOPHYLLUM, p. 66.  
     Leaves opposite, exstipulate. Parasitic shrubs . . . . . LORANTHACEÆ, p. 107.  
   *Leaves alternate.*  
     Shrubs or trees. Leaves alternate. Flowers umbelled . . ARAIACEÆ, p. 99.  
     Herbs. Leaves alternate or radical. Flowers umbelled . . UMBELLIFERÆ, p. 84.  
     Shrubs. Leaves alternate. Flowers not umbelled . . . CORNEÆ, p. 104.  
     Trailing herb with tendrils. Leaves angled . . . . . SICYOS, p. 82.  
     Trees and shrubs; bark tough. Filaments united in a tube  
     Herbs, scapigerous. Anthers 2 adnate to style . . . . . STYLIDIÆÆ, p. 166.  
 § 4. Perianth single, inferior, regular. Flowers not in the scales  
   of spikelets  
   *Leaves opposite.*  
     Trees. Calyx 4-lobed. Stamens 2 . . . . . OLEA, p. 186.

- Herbs. Stamens 4, opposite 4 perianth lobes . . . . . URTICEÆ, p. 250.  
 Climbing shrubs. Leaves compound . . . . . CLEMATIS, p. 1.  
 Erect shrubs and trees. Carpels separate, 1-ovuled . . . . . MONIMIACEÆ, p. 239.  
 Herb. Stamen 1. Styles 2 . . . . . CALLITRICHE, p. 68.
- Leaves alternate.*  
 Tree. Leaves simple, exstipulate. Calyx 5-lobed . . . . . DODONÆA, p. 44.  
 Tree. Leaves simple, stipuled. Male perianth campanulate . . . . . FAGUS, p. 248.  
 Unbranched tree. Leaves very large, pinnate . . . . . ARECA, p. 288.  
 Trees. Leaves simple. Anthers with recurved valves . . . . . LAURINÆÆ, p. 238.  
 Herbs, shrubs and trees. Stamens 4 or 5, opposite perianth lobes . . . . . URTICEÆ, p. 250.  
 Herbs. Male flower 4- or 5-partite. Female 2-partite . . . . . ATRIPLEX, p. 231.  
 Tree. Perianth of 2 peltate scales. Stamens numerous . . . . . CARUMBIUM, p. 248.  
 Climbing shrub. Leaves long, sheathing, prickly . . . . . FREYCINETIA, p. 275.  
 Herbs often large, epiphytic, usually scaly or silky.  
 Perianth 6-lobed. Stamens 6 . . . . . ASTELIA, p. 283.
- Leaves 0.*  
 Small, alpine, rigid, twiggy shrub . . . . . EXOCARPUS, p. 246.  
 Slender twining parasite . . . . . CASSYTHA, p. 239.
- § 6. Perianth single, regular, superior. (The perianth is double in most, but the calyx-limb being minute or absent it appears to be single.)
- Leaves opposite.*  
 Parasitic shrub. Leaves exstipulate. Flowers green . . . . . TUPEIA, p. 109.  
 Shrubs and herbs. Leaves stipulate. Stamens usually 4 . . . . . RUBIACEÆ, p. 110.  
 Tree. Leaves opposite and alternate, exstipulate . . . . . SANTALUM, p. 247.
- Leaves whorled* . . . . . MYRIOPHYLLUM, p. 66.
- Leaves alternate or radical.*  
 Herb. Leaves radical. Flowers small, spiked or racemed . . . . . GUNNERA, p. 67.  
 Shrubs. Leaves exstipulate. Flowers not umbelled . . . . . CORNÆÆ, p. 104.  
 Shrubs and trees. Flowers umbelled or capitate . . . . . ARAIACEÆ, p. 99.  
 Herb. Flowers umbelled or capitate . . . . . UMBELLIFERÆ, p. 84.  
 Parasite shrub. Leaves exstipulate. Flowers green . . . . . TUPEIA, p. 109.  
 Erect tree. Flowers cymose . . . . . SANTALUM, p. 247.  
 Trailing herb, with tendrils. Leaves angled . . . . . SICYOS, p. 82.
- § 5. Perianth very incomplete or 0.
- Leaves opposite.*  
 Shrub. Leaves serrate. Flowers spiked . . . . . ASCARINA, p. 253.  
 Herb. Leaves entire. Flowers solitary . . . . . CALLITRICHE, p. 68.
- Leaves alternate or radical.*  
 a. Herbs. Flowers in the axils of scales, arranged in spikelets. (Grasses, sedges, etc. Leaves sheathing, long, slender, or 0.)  
 Stems hollow, terete, jointed. Leaf-sheaths split to the base . . . . . GRAMINÆÆ, p. 317.  
 Stems solid, flat, angled or 3-gonous. Leaf-sheath entire . . . . . CYPERACEÆ, p. 296.  
 Stems solid. Leaf-sheaths usually entire. Anthers 1-celled . . . . . RESTIACEÆ, p. 293.
- b. Herbs not grassy in foliage, of various habit.  
 Marsh herbs. Flowers capitate or in large catkins . . . . . TYPHACEÆ, p. 276.  
 Water plants. Flowers obscure . . . . . NAIADÆÆ, p. 277.  
 Land plants. Flowers in very slender catkins . . . . . PIPERACEÆ, p. 254.  
 Land plants. Flowers small, green . . . . . URTICEÆ, p. 250.  
 Fleshy root-parasite, with tuberous rhizome and stout scaly peduncles . . . . . DACTYLANTHUS, p. 255.
- γ. Trees and shrubs.  
 Stem climbing. Leaves sheathing, long, prickly . . . . . FREYCINETIA, p. 275.  
 Shrub. Leaves very aromatic . . . . . PIPER, p. 254.



Erect trees. Leaves stipulate. Ovary 3-celled. . . FAGUS, p. 248.  
 Trees or shrubs. Anthers solitary in the scales of a  
 cone. Ovules solitary or few in the axils of scales,  
 without ovary or perianth. . . . . CONIFERÆ, p. 255.

## CLASS XXIV. CRYPTOGRAMIA.

(See p. lxi.)

## III. CLASSIFICATION OF THE NEW ZEALAND NATURAL ORDERS ACCORDING TO THE NATURAL SYSTEM, AS ADOPTED IN THE PRESENT WORK.

The number of New Zealand genera is so small, and many of them are so exceptional in characters, that they afford but an imperfect idea of the relations that subsist between the Orders they belong to; or between these and the same and other Orders in the world at large. The natural sequence of the Orders of plants and their relationships being determined by the characters of the majority of all the known genera which they severally include; this sequence and these relationships cannot be demonstrated by a small flora, like that of New Zealand, in which many large Orders and more small ones are unrepresented, or represented by one or two uncharacteristic genera only.

The following system is not altogether natural, but it is so in the main, and as much so as any hitherto devised. The primary divisions Phænogams and Cryptogams are perfectly natural and well-defined, and the Subclasses and Orders of Cryptogams follow, on the whole, a very natural sequence. The two Classes of Phænogams, Dicotyledons and Monocotyledons, are also natural and well defined, as are, on the whole, the Subclasses and Orders of Monocotyledons. With the Dicotyledons the case is different: the subdivisions Angiosperms and Gymnosperms are distinct and natural; but no natural arrangement of the Orders of Angiosperms has yet been devised. The Five Subclasses (*Thalamifloræ*, etc.) are only in so far natural, that each consists of Orders more or less naturally related to one another; for the cross affinities between certain Orders of all the Subclasses are very numerous, and in some cases so strong that the single technical character of the Subclass alone keeps them where they are. In the case of Subclass V., *Incomplete*, matters are still worse, the Orders of this Subclass having no common relationship, but consisting of Thalamifloral, or Calycifloral, plants in which the perianth happens to be incomplete or absent. Therefore it must be borne in mind, that the Subclasses of *Angiospermæ* are merely artificial devices, to enable us to find our way to the Order we seek; and that these Orders are connected by so many cross affinities that no one has ever yet been able to arrange them in a linear series.

For further information the reader is referred to Lindley's 'Vegetable Kingdom,'\* which contains an excellent history of this subject, besides being the best Encyclopædia of all that relates to the Natural Orders which we possess.

## A. Phænogamic or Flowering Plants.

## CLASS I. DICOTYLEDONS.

Stem, when perennial, furnished with pith, concentric layers of wood and bark. Leaves usually with netted venation. Organs of the flower generally 4 or 5 each, or multiples of those numbers. Seeds having an embryo with 2 cotyledons. In germination the radicle lengthens, and forks or branches.

The exceptions to one or other of these characters are too numerous to be indicated.

\* A work that should be in every naturalist's library (one thick volume, 8vo, with 500 woodcuts), price 36s., 3rd edition.

SUBDIVISION I. *ANGIOSPERMÆ*.

Ovules enclosed in an ovary, and the seeds in a seed-vessel.

**SUBCLASS I. Thalamifloræ.** Flowers with both calyx and corolla. Petals free, and stamens usually inserted immediately beneath the pistil or ovaries. Ovary always superior.

Exceptions: Petals 0 in *Clematis*, *Myosurus*, *Caltha*, some species of *Cruciferae*, *Colobanthus*, and *Stellaria*, united at the base in some *Portulacæ* and *Mulvaceæ*.

Sepals absent in one *Pittosporum*; petaloid in *Clematis* and *Caltha*.

Stamens perigynous in some *Stellarie* and *Colobanthus*.

§ 1. *Anthers adnate, opening by lateral slits. Pistil apocarpous.*

1. **Ranunculaceæ.** Sepals 3–10, often petaloid. Petals 0, or 5–20. Stamens indefinite. Fruit of many or few achenes or follicles.—Herbs or opposite-leaved climbers (p. 1).

Of the four genera, three have petaloid sepals and no petals.

2. **Magnoliaceæ.** Sepals and petals forming together three or more series, imbricate in æstivation. Carpel 1 or more.—Tree with alternate exstipulate leaves (p. 9).

§ 2. *Anthers opening towards the stigma (inwards). Pistil syncarpous. Placentas parietal (rarely axile in Pittosporæ).*

3. **Cruciferae.** Sepals and petals 4. Stamens 6, 4 longer than the others.—Herbs with alternate or rosulate exstipulate leaves (p. 10).

One *Lepidium* is rather shrubby. *Nasturtium* sometimes wants petals, and two or more of the stamens.

4. **Violariæ.** Sepals and petals 5. Anthers 5, their connectives enlarged or produced upwards, often connate. Placentas usually 3.—Herbs or shrubs, with alternate, stipulate leaves (p. 15).

5. **Pittosporæ.** Sepals, petals, and stamens 4 or 5. Placentas usually 2. Capsule coriaceous or woody, 2-valved.—Shrubs or trees, with usually opposite, evergreen, exstipulate leaves (p. 18).

Ovary sometimes 2–5-celled. Calyx apparently absent in one *Pittosporum*.

§ 3. *Pistil syncarpous, 1-celled. Placenta basal.*

6. **Caryophyllæ.** Sepals 4 or 5. Petals 4 or 5 or 0, free. Stamens 4 or 5, 8 or 10, hypogynous or perigynous.—Herbs with opposite, entire leaves. Flowers white or green (p. 22).

Petals absent in some *Stellarie* and *Colobanthus*. Stamens perigynous in *Colobanthus*.

7. **Portulacæ.** Sepals 2. Petals 5, usually united at the base. Stamens 5, usually opposite and adherent to the bases of the petals.—Herbs with opposite alternate or imbricate leaves. Flowers white (p. 26).

§ 4. *Pistil more or less syncarpous, 2- or more-celled. Placentas axile. Disk 0, or a raised torus.*

8. **Elatinæ.** Sepals and petals 2–5, all free, imbricate. Stamens definite, hypogynous, free. Ovary 2–5-celled; ovules many.—Small, creeping water-herb. Leaves opposite, stipulate, pellucid-dotted. Flowers minute, solitary, axillary (p. 28).

9. **Hypericineæ.** Sepals and petals 5, hypogynous, free, imbricate. Stamens indefinite, hypogynous, free or polyadelphous. Ovary 3-5-celled; styles 3-5, free or connate; ovules numerous.—Herbs shrubs or trees, with opposite, exstipulate pellucid-dotted leaves. Flowers yellow, in 3-chotomous cymes (p. 28).

10. **Malvaceæ.** Calyx-lobes 5, valvate. Petals 5, usually connate at the base and adnate to the staminal tube, contorted. Stamens indefinite, filaments monadelphous; anthers 1-celled. Ovary of 1 or more, free or connate carpels.—Herbs shrubs and trees, with often stellate down. Leaves alternate, stipulate (p. 29).

11. **Tiliaceæ.** Sepals 4 or 5, valvate. Petals 4 or 5, often lobed or cut, imbricate. Stamens numerous, on a raised torus, filaments free; anthers 2-celled, often with terminal pores. Ovary 2-10-celled.—Trees or shrubs. Leaves alternate or opposite, stipulate (p. 32).

12. **Lineæ.** Sepals 5, free, imbricate. Petals 5, free, contorted. Stamens 5, hypogynous; filaments united at the base into a cup. Ovary 3-5-celled; styles 3-5, free or connate.—Herbs. Leaves alternate, small, exstipulate. Flowers large, usually corymbose (p. 34).

13. **Geraniaceæ.** Sepals 5, free, imbricate. Petals 5, equal or unequal, free, imbricate. Stamens 10, hypogynous, all fertile or some without anthers; filaments free or united at the base. Ovary 3-5-lobed; cells usually 1-seeded.—Herbs. Leaves alternate or opposite, stipulate or exstipulate. Flowers usually axillary, solitary geminate or umbelled (p. 35).

SUBCLASS II. **Discifloræ.** Flowers with both calyx and corolla. Petals free, and stamens usually inserted upon the surface or at the base of a thickened hypogynous disk. Ovary rarely inferior.

Exceptions: Petals absent in *Dodonæa*, in one *Pomaderris*, *Discaria*, and *Alectryon*.

Stamens hypogynous in *Pennantia*, *Coriaria*, and *Dodonæa*.

Ovary inferior in *Pomaderris*.

14. **Rutaceæ.** Sepals and petals 4 or 5, free, imbricate or valvate. Stamens 8 or 10, rising from the outer base of an hypogynous disk. Ovary of 4 or 5, free or united, 2-ovuled carpels, separating when ripe into as many 1-seeded 2-valved cocci (p. 38).

15. **Meliaceæ.** Calyx small, 4- or 5-lobed, imbricate. Petals 4 or 5, linear, usually valvate and adnate at the base with the staminal tube. Stamens united into a thick tube, usually inserted below an annular or tubular disk. Ovary 3-5-celled.—Trees. Leaves exstipulate, compound (p. 40).

16. **Olacineæ.** Calyx small, 4- or 5-lobed. Petals 4 or 5, free or connate, valvate. Stamens 4 or 5, hypogynous or surrounding an annular disk. Ovary 1-celled or imperfectly 2- or 3-celled; style 1; ovules 1-3, pendulous.—Shrubs or trees. Leaves alternate, exstipulate (p. 41).

17. **Stackhousiæ.** Calyx 5-lobed. Petals 5, linear, erect, free or connate above the base. Stamens 5, 2 shorter. Ovary 2-5-celled. Fruit of 2-5 globose cocci.—Herbs. Leaves alternate, small, quite entire. Flowers small, greenish, racemose (p. 42).

18. **Rhamneæ.** Calyx superior or inferior, 4- or 5-lobed. Petals 4 or 5, minute or 0. Stamens inserted on the edges of a disk, as many as the petals and opposite them, small, incurved. Ovary 3-celled; style 1; ovule in each cell 1, erect. Fruit of 3 cocci.—Shrubs or trees, with often stellate down. Leaves alternate, rarely opposite, stipulate, or 0. Flowers small (p. 42).

19. **Sapindaceæ.** Calyx 2-5-sepalled. Petals 0 in the New Zealand species. Stamens 5-8, hypogynous or inserted within a disk. Ovary 2- or 3-celled; style 1; ovules 1 or 2 in each cell, pendulous.—Trees. Leaves exstipulate, simple or compound. Flowers racemose (p. 44).

20. **Anacardiaceæ.** Calyx 3-7-lobed. Petals 5, imbricate. Stamens 5, inserted at the base of a lobed disk. Ovary 1-celled; style 1; ovule 1, erect or pendulous.—Shrubs or trees. Leaves usually alternate, exstipulate. Flowers usually small and paniced (p. 45).

21. **Coriariæ.** Sepals 5. Petals 5, free, becoming fleshy after flowering. Stamens 10, hypogynous, all free, or 5 with the filaments adnate to the petals. Carpels 5-10, 1-celled, 1-ovuled, whorled round a fleshy disk; styles 5-10. Fruit of dry achenes enclosed in the fleshy petals.—Shrubs or herbs. Leaves opposite, exstipulate. Flowers racemose (p. 46).

This Order is a very anomalous one, whose affinities have never yet been discovered.

SUBCLASS III. **Calycifloræ.** Flowers with both calyx and corolla. Petals usually free, and stamens inserted on the tube of the calyx or top of the ovary, which is often inferior.

Exceptions: perianth apparently absent in some *Haloragææ*.

Petals absent in *Meryta*, *Fuchsia*, *Tetragonia* and some *Haloragææ*. Petals united at the base in *Acæna*, obscurely in *Tillææ*, united into a tubular corolla in some *Loranthi*.

Stamens hypogynous in some *Droseræ* and *Tillææ*.

§ 1. *Corolla very irregular or regular. Pistil apocarpous. Albumen 0.*

22. **Leguminosæ.** Calyx tubular or campanulate. Petals papilionaceous in the New Zealand species. Stamens 10, sheathing the ovary. Ovary of one 1-celled carpel. Fruit a legume (p. 47).

*Carmichaelia* has a very exceptional pod.

23. **Rosaceæ.** Calyx tubular or expanded. Petals regular. Stamens numerous (free in *Acæna*). Carpels 2 or more. Fruit various (p. 53).

§ 2. *Corolla regular. Stamens definite. Pistil syncarpous or apocarpous, inferior or superior. Albumen fleshy.*

24. **Saxifrageæ.** Calyx inferior or superior, 5-cleft. Stamens 5 or 10. Pistil syncarpous; placentas axile; ovules numerous.—Herbs shrubs or trees. Leaves opposite or alternate, simple or compound (p. 57).

Stamens 2 or 3 in *Donatia*.

25. **Crassulaceæ.** Calyx 3- or 5-sepalled, inferior, free. Petals and stamens subhypogynous. Pistil apocarpous. Follicles 1- $\infty$ -seeded.—Small herbs. Leaves opposite, quite entire (p. 61).

26. **Droseraceæ.** Calyx 5-cleft, inferior, free. Petals and stamens 4.



or 5, usually hypogynous. Ovary 1-celled, with parietal placentas; ovules numerous.—Small herbs. Leaves radical or alternate, covered with long glandular hairs (p. 62).

27. **Haloragææ.** Calyx-tube adnate to the ovary; limb 4-toothed or 0. Petals 2, 4, or 0. Stamens 2 or 4, epigynous. Ovary 1- 2- or 4-celled, with 1 pendulous ovule in each cell. Fruit small, indehiscent.—Herbs. Leaves radical or opposite or whorled. Flowers minute, often unisexual (p. 64).

*Callitriche* has no perianth, and 1 stamen in the male flower. *Myriophyllum* has an incomplete perianth in the male flowers, as have some *Gunneræ*.

§ 3. *Corolla regular. Pistil syncarpous, wholly inferior; ovules numerous, on axile placentas. Albumen 0. Petals 0 in one Fuchsia.*

28. **Myrtaceæ.** Calyx-lobes 4 or 5, valvate or imbricate. Stamens indefinite. Ovules few or many.—Trees or shrubs. Leaves evergreen, opposite, with pellucid dots (p. 69).

29. **Onagrarieæ.** Calyx-lobes 4, valvate. Stamens 8; ovules indefinite.—Herbs shrubs or trees. Leaves opposite or alternate (p. 75).

§ 4. *Corolla regular. Pistil syncarpous, wholly inferior; ovules few or numerous, on parietal placentas. Embryo straight.*

Ovary 1-celled, 1-ovuled, in the only New Zealand genus of *Cucurbitaceæ*.

30. **Passifloreæ.** Petals persistent with the sepals. Stamens definite, adnate with the stalk of the ovary; albumen fleshy.—Climber, with tendrils. Leaves alternate (p. 81).

31. **Cucurbitaceæ.** Flowers unisexual. Stamens 3 or 5, usually variously combined by their anthers. Ovary 1-celled and 1-ovuled in the only New Zealand genus; albumen 0.—Climbers or trailers, with tendrils. Leaves alternate (p. 82).

§ 5. *Corolla regular or 0. Pistil syncarpous, inferior; ovules few or numerous, on axile placentas. Albumen fleshy. Embryo curved.*

32. **Ficoideæ.** Calyx 3-∞-lobed. Petals in the New Zealand genera numerous or 0. Stamens definite or indefinite. Fruit an indehiscent drupe, or fleshy below and bursting at the top by many valves within the calyx.—Fleshy herbs. Leaves opposite or alternate (p. 83).

§ 6. *Petals regular, often small, deciduous. Stamens 4 or 5, epigynous. Pistil syncarpous. Ovary wholly inferior, with an epigynous disk; ovules solitary in each cell. Petals 0 in Meryta.*

33. **Umbelliferaæ.** Petals 5, usually imbricate. Stamens 5. Styles always 2. Fruit separating into 2 1-seeded carpels.—Herbs, rarely undershrubs. Leaves alternate, simple or compound. Flowers small, umbelled or capitate (p. 84).

34. **Araliaceæ.** Petals 5, usually valvate. Stamens 5. Styles 2-5. Fruit not separating, drupaceous or dry, 2-many-celled.—Shrubs or trees, rarely herbs. Leaves simple, or 1-7-foliolate (p. 99).

*Meryta* has no petals and anomalous inflorescence.

35. **Corneæ.** Petals 5, valvate. Stamens 5. Style 1. Ovary 1-2-celled. Fruit ovoid, 1-2-celled.—Shrubs or trees. Leaves simple (p. 104).

36. **Loranthaceæ.** Petals 4 or 5, often united into a tube. Stamens 4 or 5, inserted on the petals or free. Ovary 1-celled. Style 1. Parasitical herbs or shrubs. Leaves opposite or alternate (p. 106).

*Tupeia* is dioecious, and *Viscum* leafless.

SUBCLASS IV. **Corollifloræ** or **Monopetalæ.** Flowers with both calyx and corolla. Petals combined into a lobed corolla. Stamens inserted on the tube of the corolla.

Exceptions: Corolla absent in *Jasmineæ*.

Petals free or almost free in some *Campanulaceæ* and *Myrsineæ*.

Stamens epigynous in *Stylidiæ*, some *Campanulaceæ* and *Ericæ*; hypogynous in some *Jasmineæ*.

§ 1. *Corolla epigynous, bearing the stamens.* (See *Ericæ* in § 2.)

37. **Caprifoliaceæ.** Flowers panicled or solitary. Anthers free. Ovary 2-celled. Leaves opposite or alternate, exstipulate (p. 109).

38. **Rubiaceæ.** Flowers panicled capitate or solitary. Anthers free. Ovary 2-celled. Leaves opposite and stipulate, or whorled and exstipulate (p. 110).

39. **Compositæ.** Flowers collected in involucrate heads. Anthers combined. Ovary 1-celled; ovule erect.—Herbs shrubs or trees. Leaves usually alternate or radical (p. 121).

§ 2. *Corolla epigynous. Stamens epigynous, or inserted at the very base of the corolla.*

Stamens on the tube of the corolla in some *Ericæ*.

40. **Stylidiæ.** Stamens 2, united with the style into one column, bearing the anthers at its top.—Herbs, usually small (p. 166).

41. **Campanulaceæ.** Stamens 5, all free or more or less united in a tube sheathing the style. Anthers 2-celled, opening by 2 slits.—Herbs (p. 169).

42. **Ericæ.** Stamens 5 or 10, all free, hypogynous or epipetalous. Anthers 1-celled, or, if 2-celled, opening by terminal pores.—Small shrubs, rarely trees (p. 173).

§ 3. *Corolla hypogynous.*

a. *Stamens either opposite the corolla-lobes or more than their number. Corolla regular.*

43. **Myrsineæ.** Stamens opposite the corolla lobes, which are almost free in the New Zealand genus. Ovary and ovules as in *Primulaceæ*. Fruit an indehiscent berry.—Shrubs. Leaves with pellucid dots (p. 183).

44. **Primulaceæ.** Stamens opposite the corolla-lobes. Ovary 1-celled; ovules numerous, on a free central placenta. Fruit capsular.—Herbs. Leaves without pellucid dots (p. 185).

45. **Sapoteæ.** Stamens opposite the corolla-lobes, or more numerous. Ovary 2- or more celled.—Shrubs or trees. Leaves without pellucid dots (p. 185).

*β. Stamens as many as and alternating with the corolla-lobes (fewer in Jasmineæ).  
Corolla regular.*

Corolla absent in *Jasmineæ*.

46. **Jasmineæ.** Corolla absent in the New Zealand genus. Stamens 2. Ovary 2-celled.—Shrubs and trees. Leaves opposite, exstipulate (p. 186).

47. **Apocynæ.** Stamens 5, often adhering to the stigma. Carpels 2, usually distinct.—Climbers, often with milky juice. Leaves usually opposite, exstipulate (p. 187).

48. **Loganiaceæ.** Stamens 4–5, anthers free. Ovary 2- or more celled; placentas axile.—Herbs or shrubs. Leaves opposite, often stipulate (p. 188).

49. **Gentianeæ.** Stamens 4 or 5, anthers free. Ovary 1-celled; placentas parietal.—Herbs, with bitter juice. Leaves opposite, quite entire, exstipulate (p. 189).

50. **Boragineæ.** Stamens usually 5, anthers free or conniving. Ovary 4-lobed to the base, 4-celled; cells 1-ovuled. Fruit of 4 small nuts.—Herbs, often hispid. Leaves alternate, quite entire, exstipulate (p. 191).

51. **Convolvulaceæ.** Stamens usually 5, anthers free. Ovary entire or 2-lobed, 2–4-celled; cells 1- or 2-ovuled.—Herbs, prostrate or climbing. Leaves alternate, exstipulate, 0 in *Cuscuta* (p. 197).

52. **Solaneæ.** Stamens 5, anthers often conniving or cohering, opening by pores or slits. Ovary entire, 2-celled; ovules many, on axile placentas.—Herbs or shrubs. Leaves alternate, exstipulate (p. 200).

(See 58, *Plantagineæ*, at the end of δ.)

*γ. Stamens fewer in number than the lobes of the corolla. Corolla usually very irregular, nearly regular in many Veronicas and in Pygmæa. Ovules numerous.*

53. **Scrophularineæ.** Stamens 2–4. Ovary 2-celled; ovules many, on axile placentas.—Herbs shrubs or small trees. Leaves opposite (p. 200).

54. **Gesneriaceæ.** Stamens 4. Ovary 2-celled; ovules many, on projecting parietal placentas.—A twiggly shrub. Leaves opposite (p. 221).

55. **Lentibularieæ.** Stamens 2. Ovary 1-celled; ovules many, on a free central placenta.—Small herbs, often aquatic (p. 222).

*δ. Stamens as many or fewer than the lobes of the corolla. Corolla regular and irregular. Ovules few.*

56. **Verbenaceæ.** Corolla regular or irregular. Stamens 2, 4, or 5. Ovary rarely lobed, 2- or 4-celled; cells 1- or 2-ovuled.—Herbs shrubs or trees. Leaves opposite or alternate, simple or compound, exstipulate (p. 223).

57. **Labiataæ.** Corolla irregular or nearly regular. Stamens 2 or 4. Ovary 4-lobed to the base, 4-celled; cells 1-ovuled. Fruit of 4 small nuts.—Herbs and shrubs. Leaves opposite, simple (p. 225).

58. **Plantagineæ.** Corolla regular, scarious, 4-lobed. Stamens 4, filaments very long, flexuose. Ovary entire, 2-celled; ovules on the septum.

Capsule circumsciss.—Herbs. Leaves radical. Flowers capitate or spiked, green or brownish (p. 226).

**SUBCLASS V. Incompletæ.** Perianth single or 0.

§ 1. *Flower usually hermaphrodite. Perianth single, enclosing the fruit. Stamens hypogynous or perigynous. Ovary 1-celled, 1-ovuled (3-ovuled in some Amaranthaceæ).*

59. **Nyctagineæ.** Perianth elongate, tubular. Stamens hypogynous. Style 1. Ovule erect. Embryo folded; albumen scanty.—Shrubs trees and herbs (p. 228).

60. **Chenopodiaceæ.** Perianth 2–5-lobed or -partite. Stamens perigynous. Styles 2 or 3, or 2- or 3-fid; ovule 1, pendulous from a basilar cord. Embryo annular or spiral in mealy albumen.—Usually herbs (p. 229).

61. **Amaranthaceæ.** Perianth of 5 leaflets. Stamens perigynous, monadelphous. Style usually simple; ovules 1 or more, pendulous from basilar cords. Embryo annular in mealy albumen.—Usually herbs (p. 233).

62. **Paronychieæ.** Perianth 4- or 5-lobed or -partite. Stamens 1–10, perigynous. Style 2- or 3-fid; ovule 1, erect. Embryo annular in mealy albumen.—Herbs (p. 234).

63. **Polygoneæ.** Perianth 5- or 6-partite. Stamens 6–9, perigynous. Styles 2 or 3, very short; ovule erect. Embryo straight or curved in mealy albumen.—Herbs (p. 235).

64. **Laurineæ.** Perianth of 4–8-segments. Stamens 12–15, perigynous; anthers opening by recurved valves. Style 1; ovule 1, pendulous. Embryo with thick cotyledons; albumen 0.—Shrubs and trees, rarely herbs (p. 238).

§ 2. *Perianth single. Stamens perigynous. Carpels numerous, 1-celled, 1-ovuled.*

65. **Monimiaceæ.** Perianth 4–15-lobed; anthers opening by slits or recurved valves. Embryo small, in fleshy albumen.—Shrubs and trees. Leaves opposite (p. 239).

§ 3. *Flowers hermaphrodite. Perianth single, inferior (in flower at least), usually tubular. Stamens inserted on its lobes. Ovary 1-celled.*

66. **Proteaceæ.** Perianth of 4 narrow deciduous leaflets, often connate below. Stamens 4. Style 1; ovules 1 or more.—Shrubs or trees (p. 240).

67. **Thymeleæ.** Perianth tubular, 4-lobed. Stamens 1–4. Style 1; ovule 1, pendulous.—Shrubs with tough fibrous bark (p. 241).

68. **Santalaceæ.** Perianth 3–5-lobed, valvate. Stamens 3–6. Style simple or 3-fid; ovules 3–5, pendulous from a central placenta. Fruit often inferior, 1-seeded (p. 246).

§ 4. *Flowers unisexual. Perianth 0, or of scales (single in most Urticæ). Stamens hypogynous or perigynous. Ovary 3-celled (1-celled in Urticæ).*

69. **Euphorbiaceæ.** Fruit a 3-celled capsule.—Herbs shrubs or trees (p. 247).



70. **Cupuliferæ.** Fruit of 3-angled, 1-seeded nuts, contained in a hard 4-lobed involucre.—Trees. Leaves alternate, stipulate (248).

71. **Urticeæ.** Fruit a minute 1-seeded nut, enclosed by the perianth.—Herbs shrubs or trees (p. 250).

§ 5. *Flowers uni- bisexual. Perianth 0. Ovary 1-celled.*

72. **Chloranthaceæ.** Flowers uni- or bisexual. Stamens 1–3, epigynous. Ovary 1-celled; ovule 1, pendulous.—Herbs and shrubs. Leaves opposite (p. 253).

73. **Piperaceæ.** Flowers bisexual, minute, closely packed in slender spikes. Stamens usually 2, hypogynous. Ovary 1-celled; ovule 1, erect.—Herbs and shrubs (p. 254).

74. **Balanophoreæ.** Flowers unisexual. Stamens various. Ovary 1-celled; ovules solitary, pendulous.—Root parasites. Leafless or with scales on the stems (p. 255).

#### SUBDIVISION II. GYMNOSPERMÆ.

Ovules naked, not enclosed in an ovary.

75. **Coniferæ.** Anthers in the male, ovules in the female, inserted on scales, which often form catkins or cones.—Trees and shrubs (p. 255).

### CLASS II. MONOCOTYLEDONS.

Stem, when perennial, without pith, bark, or rings of wood, but consisting of a cellular axis with scattered longitudinal vascular bundles. Veins of the leaves usually parallel, not netted, or if so, by parallel veinlets. Perianth when present usually 3- or 6-merous, the leaflets all petaloid; often absent, the flowers being contained in the axils of scales arranged in spikelets. Stamens usually 3 or 6. Embryo with 1 cotyledon, the plumule being developed in a cavity at its side, and the rootlets from its radicular end, which does not elongate.

SUBCLASS I. **Petaloidæ.** Perianth, when present, of 6 leaflets in 2 whorls; obscure or absent in *Pandaneæ*, *Typhaceæ*, and some *Naiadeæ*.

§ 1. *Perianth superior, of 6 coloured leaflets.*

1. **Orchideæ.** Perianth very irregular. Anthers 1 or 2, sessile in a stigmatiferous column. Ovary 1-celled (p. 260).

2. **Irideæ.** Perianth regular. Stamens 3. Ovary 3-celled (p. 273).

3. **Hypoxideæ.** Perianth regular. Stamens 6. Ovary 3-celled (p. 274).

§ 2. *Perianth incomplete or 0 (see Lemna, Ruppia, and Zannichellia in § 3.)*

4. **Pandaneæ.** Flowers unisexual, in dense spikes or catkins. Perianth 0, or imperfect. Stamens numerous. Ovaries 1-celled, usually numerous and connate, truncate; stigmas sessile.—Shrubby. Leaves with sheathing bases (p. 275).

5. **Typhaceæ.** Flowers unisexual, in dense spikes or catkins. Perianth 0, or of slender hairs. Stamens crowded. Ovaries crowded, tapering into a slender style, stigma lateral.—Marsh or water plants (p. 276).

§ 3. *Perianth of 6 inferior leaflets (absent in Lemna, Ruppia, and Zannichellia).*

6. **Naiadeæ.** Perianth of small green leaflets or 0. Stamens 1–6. Ovaries 1–6, free, each 1-ovuled.—Marsh or water plants (p. 277).

7. **Liliaceæ.** Flowers hermaphrodite. Perianth of 6 petaloid leaflets. Stamens 6. Ovary 3-celled, cells usually 2- or many-ovuled (p. 280).

8. **Palmææ.** Flowers unisexual. Perianth of 6 coriaceous or fleshy leaflets. Stamens 6. Ovary 3-celled or ovaries 3, cells 1-ovuled (p. 287).

9. **Juncææ.** Flowers hermaphrodite. Perianth of 6 dry brown lanceolate leaflets. Stamens 3 or 6. Ovary 1- or 3-celled (p. 288).

SUBCLASS II. **Glumaceæ.** Perianth usually absent or of minute scales or hairs. Flowers in the axils of concave scales collected into spikelets.

The perianth is regular and evident in some *Restiaceæ*.

10. **Restiaceæ.** Perianth of 4–6 leaflets, or absent or reduced to scales. Anthers versatile, 1-celled. Ovary 1–3-celled, or of several free carpels.—Grass or rush-like plants. Leaves sheathing, sheath split to the base. Flowers unisexual (p. 293).

11. **Cyperaceæ.** Perianth 0, or of bristles or minute scales. Anthers terminal, 2-celled. Ovary 1-celled, 1-ovuled. Pericarp coriaceous. Embryo at the base of albumen.—Grass or rush-like herbs. Culms solid. Leaves sheathing, sheath entire (p. 296).

12. **Gramineæ.** Perianth 0, or of 2 minute scales. Stamens 3. Anthers versatile. Ovary 1-celled, 1-ovuled. Pericarp membranous, adhering firmly to the seed. Embryo at the side of the base of the albumen.—Herbs. Culms fistular, jointed. Leaves sheathing; sheaths split to the base (p. 317).

#### B. *Flowerless Plants*, answering to

### CLASS III. **CRYPTOGAMIA.**

Plants cellular or vascular, without true stamen, pistil, or ovules. Organs of fructification often very minute, giving origin to microscopic spores by which the species are propagated. Spores germinating by microscopic threads, or by a prothallium. Fecundation (when known) effected by spermatozoids (not by pollen grains).

SUBCLASS I. **Acrogens.**—Plants usually furnished with distinct stem and leaves, the latter symmetrically arranged. Stems usually dichotomously branched; sometimes reduced to simple fronds or membranous green expansions, then furnished with a midrib. Fructification various.

1. **Filices.** Stems of cellular tissue traversed by spirally marked vessels, which are often collected into hard woody bundles. Fructification of very

minute capsules, full of microscopic spores, situated on the under surface of the frond, or on separate branches of the frond; rarely of larger capsules, which are confluent on the under surface of the frond (*Marattia*) or collected in simple or branched spikes (*Ophioglossum* and *Botrychium*).—Plants rarely or never aquatic. Vernation circinate, except in the tribe *Ophioglosseæ* (p. 344).

2. **Lycopodiaceæ.** Stem elongate, erect creeping or pendulous, its tissues similar to those of *Filices*. Leaves imbricate all round, or distichous or tetrastichous, usually small, flat or subulate. Fructification of capsules, which are axillary in the upper leaves or in the scales of a cone, sessile, 1-3-celled, bursting by 2 or 3 valves, full of microscopic spores, which are marked by 3 radiating lines.—Plants never aquatic. Vernation somewhat circinate (p. 387).

*Phylloglossum* differs from the rest of the Order in its fleshy roots, subulate radical leaves, and solitary scape, bearing one terminal cone.

3. **Marsileaceæ.** Aquatic (freshwater) plants, of various habit, furnished with spiral vessels, creeping or floating. Capsules of 2 kinds, very various in form and structure, situated on the roots or leaves or stems of the frond, 1- or many-locular (p. 392).

*Azolla*, the only New Zealand genus hitherto discovered, consists of floating bright red pinnate fronds, covered with minute imbricating leaves.

4. **Musci.** Erect or creeping, small, usually terrestrial plants, with distinct stem and leaves, without spirally marked vessels (spirally marked cells are found only in *Sphagnum*). Leaves always small, usually with a midrib, membranous or coriaceous. Fructification of two kinds; 1, more or less obovoid or ovoid, brown, sessile or stalked, erect or drooping capsules, which open by a lid, or rarely by 4 lateral slits, or not at all, and contain minute spores; 2, minute cylindric membranous sacs (antheridia), which are axillary or crowded at the tips of the branchlets, and contain spermatozoa.

5. **Jungermannieæ.** Plants all cellular, usually with the habit of *Musci*, but often forming flat continuous fronds with a stout midrib. Leaves without a midrib, usually distichous or secund, entire, 2- or more lobed. Fructification of two kinds, as in *Musci*, but the capsules are split from the top to the base into 4 diverging valves, and the spores are mixed with spiral filaments.

6. **Marchantieæ.** Leafless, wholly cellular plants, consisting of broad, green, rather thick, flat lobed fronds, with or without a midrib, closely appressed to the ground, and emitting rootlets from the under surface; cuticle porous. Fructification of two kinds: 1, capsules, usually symmetrically disposed on the under side of a peltate peduncled receptacle, which rises from the edge of the frond (rarely solitary and sessile), and contains spores mixed with spiral filaments; 2, antheridia, contained in sessile or peduncled peltate or discoid receptacles.

7. **Characeæ.** Freshwater plants. Stems leafless, branched dichotomously, and furnished with whorled branchlets, consisting of long parallel transparent tubes often coated with an opaque crust of carbonate of lime.

Fructification of two kinds; 1, lateral red "globules" composed of 8 3-angular scales which enclose a mass of jointed filaments; 2, axillary "nucules" surrounded by 5 spiral filaments, and filled with starch granules.

**SUBCLASS II. Thallogens.**—Plants usually without a distinct leafy stem, forming a flattened or cylindric, dichotomously branched or variously formed frond or thallus, or composed of articulated threads or simple cells variously disposed; vascular or spiral tissue 0 or extremely rare. Fructification imbedded in the substance of the thallus, very various.

8. **Lichenes.** Perennial, coriaceous, or rigid or crustaceous plants, all terrestrial, consisting of a thallus which is erect or appressed to the ground, or to rocks or trees, often reduced to mere scales or a powdery crust; substance always very dense, cellular externally; filamentous internally. Fructification of two kinds: 1, septate spores contained in tubes (asci) which are usually collected into hard peltate disks or shields formed of the upper surface of the thallus, but sometimes are imbedded in cracks of the thallus; 2, spermatogones, or small sacs containing spermatia, which latter are supposed to be a form of spermatozoa; 3, pycnides, obscure organs, giving origin to spore-like bodies at their tips; 4, gonidia, or globose spore-like bodies imbedded in the filamentous substance of the thallus, and sometimes breaking through the cortical substance, and forming powdery masses called soredia and cyphella.

9. **Fungi.** Cellular, terrestrial or epiphytic or parasitic plants, presenting an infinite variety of forms, but never forming flat crusts or foliaceous expansions as the *Lichenes* and *Algæ*, frequently existing on animal matter and on living or dead foliage, often ephemeral, variously coloured, rarely green. Substance consisting of a congeries of cells or cellular filaments, usually soft or succulent, never containing gonidia. Fructification of microscopic spores attached to the outer cellular surface, or seated on the top of peculiar cells, or contained in asci as in *Lichenes*.

Most delicate spiral filaments have been found in a few genera.

10. **Algæ.** Cellular marine and freshwater plants, consisting of foliaceous variously often brightly coloured fronds, which are simple or branched or pinnately divided, with or without midrib, or reduced to cellular filaments, or to simple cells. Fructification of four kinds, free or imbedded in the tissue of the frond, either promiscuously or in separate sacs or vesicles; 1, zoospores, or minute bodies moving through the water by the motion of fine cilia, and requiring very high power of the microscope to render them visible; 2, spores of various forms, which are fertilized by antheridia; 3, antheridia, containing spermatozoa; 4, gonidia, or minute organs corresponding to the buds of higher plants.



# HANDBOOK

## OF THE

# NEW ZEALAND FLORA.

---

### CLASS I. DICOTYLEDONS.

### ORDER I. RANUNCULACEÆ.

Herbs, with alternate or radical leaves (*Clematis* excepted). Flowers usually hermaphrodite.—Sepals 3–6, free, often petaloid, usually deciduous. Petals 5–10 or 0, sometimes spurred or deformed, often with a pit or scale towards the base, deciduous. Stamens hypogynous, usually very numerous; anthers adnate. Carpels numerous, free, on a torus which sometimes elongates. Fruit of few or many 1-seeded achenes, or many-seeded follicles. Seeds with copious fleshy albumen, and a minute embryo.

An Order abounding in all temperate climates, rarer in tropical. Many European and other genera have irregular flowers, and otherwise deviate from the New Zealand types; such are the cultivated Aconite, Larkspur, Columbine, etc. All the New Zealand genera are British.

Climbing shrubs with opposite compound leaves . . . . .	1. CLEMATIS.
Herb. Leaves radical, linear. Sepals 5. Petals 0 . . . . .	2. MYOSURUS.
Herbs. Sepals 5. Petals 5–20. Carpels 1-ovuled . . . . .	3. RANUNCULUS.
Herb. Leaves radical, sagittate. Sepals petaloid. Petals 0. Carpels many-ovuled . . . . .	4. CALTHA.

#### 1. CLEMATIS, Linn.

Much branched, slender, climbing shrubs, with opposite compound leaves, and panicles of white or cream-coloured polygamous flowers.—Sepals 4–8, petaloid, valvate. Stamens 6 or more. Carpels many, 1-ovuled. Achenes indehiscent, the styles elongated into long feathered awns.

A large and widely diffused genus, of which some foreign species have blue or purple flowers, or herbaceous or erect stems, or entire leaves, or minute petals. The New Zealand species are very variable, passing one into the other; their flowers are almost unisexual, the males having no carpels, and the females few stamens. The anthers have no appendage at the tip as most Australian species have, *C. parviflora* alone having a very minute one.

*Leaves simply 3-foliate.*

- Flowers  $1\frac{1}{2}$ –4 in. Sepals oblong. Leaflets 2–3 in. . . . . 1. *C. indivisa*.  
 Flowers 1–2 in. Sepals oblong. Leaflets  $1-1\frac{1}{2}$  in., lobulate . . . . . 2. *C. hexasepala*.  
 Flowers  $\frac{3}{4}$ – $1\frac{1}{4}$  in. Sepals linear, with thick tomentum . . . . . 3. *C. foetida*.  
 Flowers  $\frac{1}{3}$ –1 in. Sepals linear, with silky pubescence . . . . . 4. *C. parviflora*.

*Leaves usually biternate, or 3-foliate with 3-partite leaflets.*

- Flowers  $1-1\frac{1}{2}$  in. Sepals linear-oblong . . . . . 5. *C. Colensoi*.

1. **C. indivisa**, Willd.;—*Fl. N. Z.* i. 6. A large, strong, woody climber, with trunk often  $\frac{1}{2}$  ft. diam. Leaves 3-foliate, coriaceous, glabrous or downy; leaflets 1–4 in. long, varying from linear-oblong to ovate-cordate, all petioled, entire, rarely lobed. Flowers 1–4 in. diam., most abundantly produced, white, sweet-scented. Sepals 6–8, broad- or narrow-oblong. Anthers obtuse, oblong. Achenes very downy.—Hook. Bot. Mag: t. 4398 (a variety with leaflets lobed as in *C. hexasepala*); *C. integrifolia*, Forst.

Abundant throughout the islands, festooning trees, etc., especially on the skirts of forests, *Banks and Solander*, etc.

2. **C. hexasepala**, DC.—*C. Colensoi*, Hook. fil., *Fl. N. Z.* i. 6. t. 1. Smaller in all parts than *C. indivisa*, and best distinguished by its smaller narrow ovate-cordate, often lobulate leaflets, small flowers, and very narrow anthers. Leaves glabrous, coriaceous; leaflets  $1-1\frac{1}{2}$  in. long, coriaceous, ovate-lanceolate, serrate or lobulate, rarely entire. Peduncles pubescent. Flowers white, 1–2 in. diam. Sepals 6, broadly linear, obtuse, downy. Anthers long, linear, obtuse. Achenes pilose.—*C. hexapetala*, Forst.

**Northern** Island: sandy banks on the east coast, *Colenso*. **Middle** Island, *Forster*: Upper Awatere Valley, *Sinclair*. I have examined an authentic specimen of this, gathered and named by Forster, in Mus. Paris, and find that the plant which I formerly called *Colensoi* is the true *hexasepala*.

3. **C. foetida**, *Raoul, Choir*, xxiv. t. 22;—*Fl. N. Z.* i. 7. Leaves as in *C. parviflora*, but coriaceous, larger, and glabrous below. Panicle densely tomentose, as are the sepals. Flowers small,  $\frac{1}{3}$ – $\frac{2}{3}$  in. diam., foetid (*Raoul*). Sepals 4–6, linear. Filaments slender; anthers shortly linear-oblong. Achenes silky.

Var.  $\beta$ . *depauperata*, *Fl. N. Z.* l. c. Leaflets narrow-linear, very small,  $\frac{1}{8}$ – $1\frac{1}{4}$  in. diam. Peduncles short, 1-flowered.

Common in the **Northern** and **Middle** Islands. Var.  $\beta$ . Lake Rotoatara, *Colenso*; Canterbury, *Travers*. The large leaflets and dense tomentum on the inflorescence distinguish this from *parviflora* and *Colensoi*, and the small flowers and narrow sepals from *hexasepala*.

4. **C. parviflora**, *A. Cunn.*;—*Fl. N. Z.* i. 7. A slender climber, more or less covered with fulvous pubescence. Leaves 3-foliate; leaflets  $\frac{1}{3}$ –1 in. long, ovate-cordate, usually broad, subacute, entire or lobed, pubescent chiefly beneath. Flowers  $\frac{1}{3}$ –1 in. diam. Sepals covered with silky pubescence, narrow-linear. Filaments slender, anthers short, broad, with a minute swelling at the apex of the connective. Achenes silky.

Var.  $\beta$ . *depauperata*: Leaflets very small. Sepals narrowed into long slender points.—Perhaps a distinct species.

**Northern** Island: abundant on skirts of woods, *Banks and Solander*, etc. Var.  $\beta$ , *Nelson, Travers*.

5. **C. Colensoi**, *Hook. f.*—*C. hexasepala*, *Fl. N. Z.* i. 7 (not DC.). A

slender climber. Leaves generally biternate, or 3-foliolate with the leaflets 3-lobed or 3-partite. Leaflets small,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, more membranous than in *C. fetida*, ovate-cordate, unequally toothed, lobed or almost 3-partite. Peduncles and pedicels slender. Flowers small, green, very sweet-scented, 1– $1\frac{1}{2}$  in. diam., male polyandrous; hermaphrodite 6–8-androus. Sepals silky. Anthers narrow-linear. Achenes glabrous or silky.—*C. hexasepala*, Lindl. Bot. Reg. xxxii. t. 44.

Var. *β. rutafolia*, Fl. N. Z. i. 7. Leaves biternate or bipinnate, leaflets  $\frac{1}{4}$  in. long.

In various parts of the **Northern** and **Middle** Islands. Var. *β*, common in the **Middle** Island. Allied to *C. hexasepala*, from which it is easily distinguished by its smaller size and small green flowers; and from *fetida* and *parviflora*, by the broad sepals and narrow long anthers: it is certainly not the *C. hexapetala* of Forster, to which I gave the name of *C. Colensoi* in the New Zealand Flora.

## 2. MYOSURUS, Linn.

Small stemless annual herbs, with linear leaves and many 1-flowered scapes.—Sepals 5, gibbous or tubular or spurred at the base. Petals 0 in the N. Z. species. Stamens 5 or more. Carpels 1-ovuled. Achenes small, beaked, sessile and crowded on the torus, which elongates as they ripen.

A small genus, native of the temperate northern and southern hemispheres.

1. **M. aristatus**, Benth.;—Fl. N. Z. i. 8. About 1 in. high. Leaves  $\frac{1}{2}$ – $\frac{1}{3}$  in. broad. Flower minute, greenish, apetalous. Sepals with a spurred base. Stamens 5 or 6. Fruiting torus  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, erect.

**Northern** Island: pebbly heath near Cape Palliser, *Colenso*; also a native of California, and of the Andes of Chili, at 11,500 ft. elevation, but not found in Australia, where the European (and only other known) species takes its place.

## 3. RANUNCULUS, Linn.

Herbs with petioled radical leaves, and yellow or white flowers.—Sepals 3–5, concave. Petals 5–20, with 1–3 glands or scales near the base. Achenes numerous, small, with short, straight or hooked styles, and one ascending ovule.

A very large genus in all temperate countries, rare in tropical; many are acrid and poisonous. Some of the N. Z. species are the finest known; all are very variable indeed.

1. *Stem erect. Leaves peltate. Flowers white or cream-coloured.*

Margin of leaf simply crenate . . . . . 1. *R. Lyallii*.

Margin of leaf bicrenate and lobed at the base . . . . . 2. *R. Traversii*.

2. *Stem erect, without creeping stolons. Leaves not peltate. Flowers yellow (white in Buchananii). Achenes not mucronate.*

a. *Achenes tumid, often angled (not flattened, with thick margins).*

Leaves entire, 4–8 in. Petals 5–6. Achenes hirsute . . . . . 3. *R. insignis*.

Leaves entire, 1–3 in. Petals 5–8. Achenes glabrous . . . . . 4. *R. pinguis*.

Leaves deeply 3–7-lobed. Petals 10–15. Flowers many,  $1\frac{1}{2}$  in. . . . . 5. *R. nivicola*.

Leaves 3–5-lobed. Petals 10–12. Flowers few,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. . . . . 6. *R. geraniifolius*.

Glabrous. Leaves lobed or partite. Scape 1-flowered. Flowers white . . . . . 7. *R. Buchananii*.

Glabrous, fleshy. Leaves multifid, cauline involucrate. Flowers many . . . . . 8. *R. Haastii*.

Glabrous, fleshy. Leaves multifid. Scape naked, short, 1-flowered . . . . . 9. *R. crithmifolius*.

Silky, short, stout. Leaves multifid. Scape stout, naked, 1-flowered . . . . . 10. *R. sericophyllus*.

Pilose, slender. Leaves multifid. Scape slender, naked, 1-flowered . . . . . 11. *R. Sinclairii*.

b. *Achenes flattened, border thickened; style short, hooked. Leaves hairy.*

- Stem branched, leafy. Leaves lobed or pinnate. Peduncle slender, longer than the leaves. Sepals reflexed . . . . . 12. *R. plebeius*.  
 Stem 0. Leaves all radical. Scapes slender, longer than the leaves. Sepals spreading . . . . . 13. *R. lappaceus*.  
 Stem leafy. Scape shorter than the leaves, very stout, 1-flowered 14. *R. subscaposus*.  
 3. *Stem creeping, or with creeping stolons (unknown in R. gracilipes). Flowers yellow. Sepals reflexed? Achenes tumid, not muricate.—Marsh or water plants, all glabrous except 19. Scapes 1-flowered.*  
 Leaves 3-5-partite. Flowers  $\frac{1}{2}$ – $\frac{3}{4}$  in. Petals 5-10, narrow . . . 15. *R. macropus*.  
 Leaves 3-5-partite. Flowers  $\frac{1}{4}$ – $\frac{3}{4}$  in. Petals 5-8, linear . . . 16. *R. rivularis*.  
 Leaves 3-foliolate. Flowers  $\frac{1}{4}$ – $\frac{1}{2}$  in. Petals 5-8, spatulate . . . 17. *R. acaulis*.  
 Leaves pinnate or 3-5-foliolate. Flowers  $\frac{1}{2}$ – $\frac{3}{4}$  in. Petals 8-10, obovate-cuneate . . . . . 18. *R. gracilipes*.  
 Stem very stout, short. Leaves entire or lobed. Scape very short. Petals 10-15. . . . . 19. *R. pachyrrhizus*.

4. *Stem very slender, pilose. Achenes muricate.*

- Flowers minute, almost sessile, opposite the leaves . . . . . 20. *R. parviflorus*.

1. **R. *Lyallii***, *Hook. f., n. sp.* An erect, very handsome, coriaceous plant, 2 to 4 ft. high, with paniculately branched many-flowered stem. Leaves peltate, on long stout petioles, glabrous; limb orbicular, very concave, thick and coriaceous, 15 in. diam., simply crenate; veins reticulated; cauline sessile, lobed and crenate; seedling-leaves not peltate, broadly rhomboid, with cuneate bases. Peduncles very numerous, villous, stout, erect, with linear-oblong bracts. Flowers waxy-white, 4 in. diam. Sepals 5, broad, pilose. Petals broadly cuneate, with an obscure oblong basilar gland. Stamens small, short; anthers oblong. Torus cylindric, hairy, lengthening after flowering. Achenes villous, oblique; style flexuose, subulate; edges compressed, not margined.

**Middle Island:** Milford Sound, *Lyall*; moist places in the Southern Alps, 2-3000 ft., *Travers, Sinclair, and Haast*; Otago, alt. 1-4000 ft., *Hector and Buchanan*. "Water Lily" of the shepherds. The most noble species of the genus. This and the following are the only known *Ranunculi* with peltate leaves.

2. **R. *Traversii***, *Hook. f., n. sp.* Very similar to *R. Lyallii*, but smaller, the leaves 6 to 7 in. diam. and broadly twice or thrice crenate with deeper notches, and with two incisions near the base. Flowers cream-coloured.

**Middle Island:** moist gullies in Wurumui mountains, *Travers*. I follow Mr. Travers's opinion in distinguishing this species, which is certainly closely allied to the former. I have but very indifferent specimens.

3. **R. *insignis***, *Hook. f. Fl. N. Z. i. 8. t. 2.* Erect, robust, paniculately branched, villous, often 4 ft. high, fulvous or rufous when dry. Leaves rounded-cordate, 4-8 in. broad, very coriaceous, crenate and lobed; petioles 6 in. long. Peduncles very numerous, stout, with (often opposite) linear-oblong bracts. Flowers golden,  $1\frac{1}{2}$  in. diam. Sepals 5-6, oblong, woolly at the back. Petals 5-6, obcordate, with 3 glands near the base. Achenes forming a small head upon an oblong pubescent torus, villous, tumid, with a slender, nearly straight style.

**Northern Island:** Ruahine range, Tongariro, and Hikurangi, *Colenso*.

4. **R. *pinguis***, *Hook. f. Fl. Antarct. i. 3. t. 1.* Stout, rather fleshy,



erect, 4–10 in. high; stem simple, branched, more or less villous with scattered soft white hairs, or quite glabrous. Radical leaves on short (2–3 in.) stout petioles, fleshy, rounded reniform, deeply crenate-lobulate, 1–3 in. diam., veins reticulated, in young plants oblong or cuneate; cauline more or less cut. Scares 1- or many-flowered, very stout or slender. Flowers  $\frac{3}{4}$ –1 in. diam., golden. Sepals linear-oblong, glabrous or hairy. Petals 5–8, obovate-cuneate, more or less retuse; glandular depressions 1–3 at the base, between the veins. Achenes numerous, crowded, forming a globose head, glabrous, sharply angled; style subulate, nearly straight.

Var. *a*. Scares branched, many-flowered. Petals longer than sepals. Head of fruit small.—*R. Munroi*, *Fl. N. Z.* ii. 323.

Var. *b*. Much shorter, stouter, and more fleshy. Scares 1- or few-flowered. Sepals as long as petals.—*R. pinguis*, *H. f. l. c.*

**Middle Island**: mountains of Nelson, summit of Macrae's Run, Tarndale, Discovery Peaks, and Wairau Gorge, alt. 4–5500 ft., *Munro*, *Sinclair*; Southern Alps, *Haast*. **B. Lord Auckland's** group and **Campbell's** Island, *J. D. H.* Var. *b* is certainly only an Antarctic form, with a more succulent, stouter habit, 1-flowered scares, shorter petals, and larger heads of carpels.

5. **R. nivicola**, *Hook.*;—*Fl. N. Z.* i. 8. Erect, paniculately branched, 2–3 ft. high, hirsute with lax, soft, white hairs, or nearly glabrous. Leaves long-petioled, rounded cordate or reniform, 3–5 in. diam., deeply 3–7-lobed; lobes broadly euneiform, ineiso-crenate; cauline laciniate; petioles 8–12 in. Flowers numerous, large, bright yellow,  $1\frac{1}{2}$  in. diam. Sepals 5, linear-oblong, hirsute. Petals 10–15, narrow cuneate, notched, with one gland at the base. Achenes forming a small broadly ovoid or rounded head, glabrous; style straight, hooked at the tip.—*Hook. Ic. Pl. t.* 571–2.

**Northern Island**: near the perpetual snow on Mount Egmont, *Dieffenbach*.

6. **R. geraniifolius**, *Hook. Fl. N. Z.* i. 9. *t.* 3. Tall, slender, sparingly branched, 1–2 ft., glabrous or villous in parts, especially near the root, with white, long, silky hairs. Radical leaves broadly reniform, 2–3 in. diam., deeply 3–5-lobed; lobes cuneate, crenate-lobed; cauline sessile, cut and lobed; petioles slender, 6–8 in. Peduncles slender, glabrous or villous. Flowers  $\frac{1}{2}$ – $1\frac{1}{2}$  in. diam. Sepals oblong, glabrous. Petals 10–12, golden, twice as long as broad, blunt, gland depressed, close to the base. Achenes turgid, with short flexuose styles, glabrous, collected into a small globose head.

**Northern Island**: snow rills on the Ruahine range, *Colenso*. **Middle Island**: top of Gordon's Nob, *Munro*. Closely allied to *R. nivicola*, but smaller in all its parts; the rhizome may be creeping, but I think not.

7. **R. Buchanani**, *Hook. f., n. sp.* Stout, erect, a span and more high, silky or glabrous. Root-stalk as thick as the thumb, full of milky viscid fluid; rootlets thick, fibrous. Leaves radical on long thick petioles 1–4 in. long, reniform in outline, ternatisect, 2–6 in. broad; divisions petioled, more or less cut into linear or cuneate, 3–5-fid lobes; cauline similar, sessile. Flowers solitary, large,  $2\frac{1}{2}$  in. broad, white. Sepals 5, reflexed, villous. Petals 15–20, linear-oblong. Achenes turgid, pilose; styles subulate,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, collected into a globose head.

**Middle Island**: Otago, Lake district, in large patches, alt. 5–6000 ft., *Hector* and *Buchanan*; ? Macaulay river and Waimakeriri country, alt. 2–5000 ft., *Haast* (both without

flowers). I have a fine coloured drawing of this plant from Mr. Buchanan; it is a very beautiful species, described as having the leaves at times almost entire.

8. **R. Haastii**, *Hook. f., n. sp.* Very stout, fleshy, glabrous, a span high. Radical leaves broadly reniform, 3 in. diam., palmately cut to the base into 5-7 deeply and irregularly laciniate, fleshy, blunt lobes; petiole tapering downwards, 3-4 in. long. Scape as thick as the finger, naked below, with a crowded mass of sessile laciniate cauline leaves, forming a sort of leafy involucre to the numerous 1-flowered naked peduncles. Flowers absent. Achenes forming a globose head as large as a nut, fleshy, very numerous, large,  $\frac{1}{4}$  in. long, on a globose swollen torus, glabrous, turgid; style long, flattened, subulate.

**Middle Island**: shingle beds on Mount Torlesse and the Ribbon-wood range, alt. 4500 to 6000 ft., *Haast*. A most remarkable plant, of which I have but two imperfect specimens; it is probably very variable, and other specimens may deviate much from the above description.

9. **R. crithmifolius**, *Hook. f., n. sp.* Small, perfectly glabrous, very fleshy, glaucous, stemless; rootstock short, stout, horizontal, with thick fleshy fibres. Leaves all radical, on recurved petioles 1-2 in. long, blade broad,  $\frac{1}{2}$ -1 in. broad, reniform in outline, biternately multifid; segments short, linear,  $\frac{1}{10}$  in. long, obtuse. Scape stout, fleshy, erect, shorter than the leaves, single-flowered. Flowers small. Sepals linear-oblong. Petals not seen. Achenes in a globose head,  $\frac{1}{2}$  in. diam., turgid, keeled; style sharp, straight, subulate.

**Middle Island**: Wairau Gorge, on shingle slips, alt. 6000 feet, *Travers*. A very singular plant, easily recognized by its glaucous, fleshy habit, finely divided leaves, and single-flowered, short scapes.

10. **R. sericophyllus**, *Hook. f., n. sp.* Short, stout, erect, very silky, scapigerous, 1-flowered; root fibrous. Leaves all radical, 1-2 in. long, petiole stout, blade broadly ovate in outline, tripinnatisect, membranous; segments small, linear-oblong, subacute, with a pencil of silky hairs at the tip. Scape stout, erect, very silky, longer than the leaves, 1-flowered. Flower 1-1 $\frac{1}{2}$  in. diam. Sepals oblong, membranous, spreading, almost as long as the petals. Petals 8-10, obovate-cuneate, rounded at the tip, bright yellow; glands 3, naked. Achenes not seen.

**Middle Island**: snow holes on Mount Brewster, and Hopkins river, amongst grass, alt. 5-6000 feet, *Haast*. A beautiful little plant, allied to the Tasmanian *R. Gunnii*, and like it, with 3 glands on the petals, but much more robust and silky, with large golden-yellow flowers, membranous leaves, with much smaller, shorter, ultimate segments.

11. **R. Sinclairii**, *Hook. f., n. sp.* Small, 2 to 8 in. high, almost glabrous, with a few thin long silky hairs at the base of the petioles, and sometimes on the petioles and scapes; rootstock stout, prostrate, with stout fibres. Leaves tufted, 1-4 in. long, ovate-oblong in outline, bipinnatisect or multifid; segments narrow-linear, short, spreading, primary divisions 2 to 4 pairs, opposite, ovate in outline. Scape slender, leafless, 1-flowered. Flower  $\frac{1}{2}$  in. diam., golden-yellow. Sepals 5. Petals 5, linear-obovate, with a deep oblong gland below the middle. Achenes with subulate, short, straight styles.

**Middle Island**: mountains above Tarndale, alt. 5000 ft., *Sinclair*; Wairau Gorge, alt. 4-5000 ft. *Travers*; Otago, Lake district, 6000 ft., *Hector and Buchanan*. A very peculiar little species, quite unlike any other, easily recognized by its small size and finely-cut leaves. The rootstock is prostrate, but I do not think the plant belongs to the creeping section of the genus, which is almost wholly glabrous. It resembles the Andean *R. dichotomus* more

than any other. A Ruahine-range plant, of Colenso, with long hairs on scapes and petioles, and less divided leaves, but without flower, may be a form of this.

12. **R. plebeius**, Br.;—*Fl. N. Z. i. 9.*—*R. hirtus*, Banks and Sol.; *Fl. N. Z. i. 9.* Short or tall, more or less branched, and covered with long spreading or appressed hairs. Leaves mostly radical, long-petioled, 3-foliolate or pinnately biternate; leaflets usually broadly ovate, lobed and toothed. Scapes or branches numerous, ascending, slender, leafy, branched, 10–24 in. long, with few sessile or petioled leaves. Peduncles slender, glabrous or covered with appressed or patent, rigid or soft hairs. Flowers  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam. Sepals oblong, reflexed. Petals twice as long, obovate, rounded at the tip, with a small depressed gland at the base. Achenes glabrous, compressed, forming a rounded head; margin thickened; style short, hooked; receptacle elongate-ovoid, pilose.—*R. acris*, A. Rich. Flora, not Linn.

Abundant throughout the islands, Banks and Solander, etc. A common Australian plant, and probably a form of a South African and European one.

13. **R. lappaceus**, Sm., var. **multiscapus**.—*R. multiscapus*, Hook. f. *Fl. N. Z. i. 9. t. 5.* Much smaller than *R. plebeius*, 1–10 in. high, more or less hairy or hirsute, and differing in the entire or 3-lobed leaves, slender single-flowered scapes, and spreading sepals. Leaves  $\frac{1}{4}$ –1 in. long, cuneate or ovate or ovate-rotundate, coarsely erenate, entire or 3-lobed, or 3-partite. Scapes usually longer than the leaves, covered with spreading or appressed hairs. Petals often large and bright yellow.

**Northern and Middle Islands**: common in many situations, especially subalpine ones, ascending to 3000 feet in Otago. A most abundant Tasmanian and Australian plant.

14. **R. subscaposus**, Hook. f. *Fl. Antarct. i. 5.* Erect or decumbent, very hairy, almost hispid, 6–10 in. high; root fibrous. Leaves on petioles 4–8 in. long, covered with spreading or appressed hairs; blade 1–1 $\frac{1}{2}$  in. long, hairy on both surfaces, either broadly triangular-ovate and 3-lobed to the base, the lobes cuneate and incised, or entire with a cuneate base, and the margin above the middle deeply lobed or eut. Scape or stem shorter than the leaves, hispid or villous, sometimes running. Flowers small,  $\frac{1}{3}$ – $\frac{1}{2}$  in. broad. Sepals 5, spreading, membranous. Petals 5, bright yellow. Ripe achenes not seen.

**Middle Island**: Hopkins river, shady gorges near snow, alt. 4–5000 ft., Haast. **Campbell's Island**, Lyall. This seems an alpine ally or a form of *R. plebeius*, remarkable for the stout hispid or hairy scapes or flowering branches being shorter than the leaves.

15. **R. macropus**, Hook. f. *Fl. N. Z. i. 10.* Perfectly glabrous. Stems slender, 2 ft. long and more, fistular prostrate and rooting. Leaves 1–3 in. diam., semicircular in outline, cut to the base into 3–5 leaflets; leaflets broad- or narrow-cuneate, irregularly eut and lobed at the apex, lobes obtuse; petiole 4–12 in. long, weak. Peduncles solitary, axillary, those near the ends of the branches short, the rest very long. Flower  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam. Sepals 5. Petals 5–10, longer or shorter than the sepals, narrow obovate-oblong; gland depressed, basal. Achenes turgid, glabrous, smooth, collected in a small globose head; style subulate; receptacle oblong, glabrous.—Hook. Ic. Pl. t. 634.

Common in pools and marshes, apparently throughout the the islands, from Poverty Bay, Colenso, to Otago, Lindsay. This differs from *R. rivularis* chiefly in its very great size, more lax habit, very long petioles, and the much broader segments of the leaves.



16. **R. rivularis**, *Banks and Sol.*;—*Fl. N. Z.* i. 11. Creeping, perfectly glabrous, slender. Stems tufted, or sending out creeping stolons, or prostrate and branching at the nodes, or floating and branching irregularly. Leaves broadly ovate, reniform or semicircular,  $\frac{1}{2}$ –1 in. diam., cut into 3–7 leaflets, which are linear or narrow-cuneate, deeply lobed and cut at the apex or to the middle, sometimes ternatisect; petioles 1–3 in. long. Scapes or peduncles slender, longer than the leaves, 1-flowered. Flower  $\frac{1}{4}$ – $\frac{3}{4}$  in. diam. Sepals 5. Petals 5–8, linear-oblong; gland depressed, placed just below the middle. Achenes as in *R. macropus*.

Var. *α. major*, Benth. *Fl. Austral.* i. 14. Suberect; leaves tufted.—*R. incisus*, Hook. *f. Fl. N. Z.* i. 10, t. iv.

Var. *β. subfultans*, Benth. l. c. Floating, or prostrate in wet swamps. Leaves alternate.—*R. rivularis*, *Fl. N. Z.* i. 11; *R. inundatus*, *Banks and Sol.*; *Fl. Tasm.* i. 8.

Abundant in watery places throughout the islands, *Banks and Solander*, etc. Also abundant in Australia.

17. **R. acaulis**, *Banks and Sol.*;—*Fl. N. Z.* i. 11. Small, perfectly glabrous, rather succulent. Stems with creeping stolons, 4–6 in. long. Leaves tufted,  $\frac{1}{2}$ – $\frac{3}{4}$  in. broad, cut into 3, obovate, entire or 2–3-lobed, coriaceous, broad, obtuse leaflets; petioles 1–3 in. long. Scapes 1-flowered, usually shorter than the petioles. Flower  $\frac{1}{4}$ – $\frac{1}{3}$  in. diam. Sepals 5. Petals 5–8, spatulate; gland depressed, near the middle of the petal. Achenes as in *R. macropus*.

**Northern and Middle Islands**: sandy and gravelly places, by rills of water. Bay of Islands, not rare, but much more so than *R. inundatus*; **Lord Auckland's** group, *J. D. H.* Much smaller than either of the foregoing, and at once recognized by the nearly entire broad leaflets. The Valdivian *R. stenopetalus*, Hook. *l. c.* Pl. t. 667, is the same species, I think.

18. **R. gracilipes**, *Hook. f., n. sp.* Small, perfectly glabrous, slender. Stems creeping? Leaves all radical, variable in size; petioles slender, 1–4 in. long; blade pinnately divided, either pinnate, with 2–3 pairs of rounded, 3–4-lobed, sessile leaflets,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, or biternately divided with the leaflets petioled, wedge-shaped, deeply lobed, 1 in. long. Scapes 3–6 in. long, very slender, 1-flowered. Flowers  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam., golden-yellow. Sepals glabrous, oblong. Petals 8–10, twice as long, obovate-cuneate, retuse; depressed gland small, near the very base.

**Middle Island**: banks of Lake Okau, *Haast*. A very distinct but variable species, with the habit and appearance of *R. rivularis*, but the leaves are pinnately divided. My specimens are very imperfect, and I place it in the creeping section from its resemblance to the preceding.

19. **R. pachyrrhizus**, *Hook. f., n. sp.* Small, densely matted, very succulent. Scapes and petioles with long weak hairs. Stem prostrate, cylindrical, creeping, as thick as a goose-quill. Leaves very short, small, all radical; petioles stout, fleshy,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long; blade cuneate or obovate-cuneate,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, acutely lobed or cut. Scape short, stout, 1-flowered. Flowers  $\frac{2}{3}$ –1 in. diam. Sepals linear-oblong, membranous. Petals 10–15, obovate-spatulate, bright yellow; depressed gland near the base. Achenes not seen.

**Middle Island**: Otago, Lake district, alt. 6–8000 ft., covering large tracts in low matted patches, *Hector and Buchanan*. A most curious little species, best known by its habit and habitat.

20. **R. parviflorus**, *Linn.*, var. **australis**, *Benth. Fl. Austral.* i. 15.



—*R. sessiliflorus*, Br. ;—Fl. N. Z. i. 11. Slender, hairy, annual. Stem prostrate or rarely erect, branching, 1–12 in. long. Leaves few radical and many cauline, alternate, small,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., orbicular, 3–5-lobed, the lobes entire or variously cut, on short slender petioles. Flowers very small, on the branches opposite the leaves, solitary, almost or quite sessile. Sepals fugacious. Petals 5, about as long as the sepals. Achenes few, in a small globular head, compressed with thin edges, pilose, the sides covered with minute tubercles or hooks ; style short, hooked.

**Northern** Island, *Colenso* (perhaps introduced). Common in temperate Australia. The typical *R. parviflorus* is a S. European plant.

#### 4. CALTHA, Linn.

Glabrous, tufted herbs, with most or all of the leaves radical, and 1-flowered scapes.—Sepals 5 or more, petaloid, imbricate. Petals 0. Stamens numerous. Carpels several, with many ovules in two rows on the ventral suture. Follicles splitting along the inner face, several-seeded.

A small genus, found in the temperate and cold regions of both hemispheres.

1. **C. novæ-Zelandiæ**, *Hook. f. Fl. N. Z. i. 12. t. 6.* Short, stout, tufted, glabrous, perennial, with a thick rootstock, numerous radical leaves, and short, thick, 1-flowered scape. Leaves spreading ; blade ovate-oblong, notched at the apex, deeply cordate and auricled at the base, with the obtuse auricles turned up and appressed to the surface of the leaf ; petioles 1–6 in., dilated at the base into large membranous sheaths. Flowers 1–2 in. diam. Sepals 5–7, linear-subulate. Stamens short, very numerous. Carpels 5–7, broadly ovate, gibbous ; style short, hooked.

**Northern** Island : top of the Ruahine mountains, *Colenso*. **Middle** Island ; Mount Brewster and Hopkins river, alt. 5–6000 ft., *Haast* ; Otago, alpine districts, alt. 4–6000 ft., *Hector and Buchanan*. The *C. introloba*, *F. Muell.*, of Tasmania and Victoria (a plant not discovered when this was published) is very closely allied to this, differing chiefly in the recurved styles.

### ORDER II. MAGNOLIACEÆ.

#### Tribe WINTEREÆ.

Aromatic shrubs or trees, with alternate, exstipulate leaves.—Sepals and petals imbricated in 2, 3, or many series, very deciduous. Stamens numerous ; hypogynous. Filaments often thick or dilated ; anthers adnate. Carpels few, in 1 series, with 2 or more ovules attached to the ventral suture. Stigma sessile and terminal or decurrent along the suture. Ripe carpels of free, small drupes follicles or berries. Seeds few ; testa shining ; albumen copious, fleshy ; embryo small.

This description refers only to the tribe *Winteræa*, which alone is represented in N. Zealand. This Order contains many genera, in some of which the carpels are very numerous and spiked, in others combined, and in some the flowers are unisexual ; it abounds in the southern United States, and the mountainous regions of India and Eastern Asia ; its qualities are aromatic. The genus *Drimys* contains one S. American, two Australian, one alpine Bornean, and probably several New Caledonian species.

1. **DRIMYS**, Forst.

Sepals 2 or 3, membranous, combined into an irregularly lobed calyx. Petals 6 or more, in 2 or more series. Filaments thickened upwards; anther-cells diverging. Carpels few.

1. **D. axillaris**, Forst.;—*Fl. N. Z.* i. 12. A small, slender, evergreen tree, 10–30 ft. high, with black bark, aromatic and pungent in all its parts. Leaves 1–6 in. long, elliptical-ovate, blunt, shortly petioled, quite entire, bright-green above, glaucous below, pellucid-dotted, midrib hairy beneath. Flowers small, axillary or from scars of fallen leaves, solitary or few together; pedicels slender. Petals unequal, linear. Stamens 8–10, in several series. Berries about 3, size of a peppercorn. Seeds several, angled.—*D. colorata*, Raoul, Choix, t. 23; *Wintera axillaris*, Forst. Prodr.

Abundant in forests throughout the islands, *Banks and Solander*, etc. “Pepper-tree” of the colonists. Wood makes pretty veneers, *Buchanan*.

ORDER III. **CRUCIFERÆ.**

Herbs, usually with small racemose flowers.—Sepals 4, free. Petals 4, free, placed crosswise. Stamens 6 (rarely 1, 2, or 4), hypogynous, 2 longer than the others. Ovary 2-celled, with 2 or more ovules. Capsule 2- (rarely 1-) celled, bursting longitudinally by 2 valves, which fall away from the seed-bearing placentas. Seeds exalbuminous, with the radicle turned up toward the edges (accumbent) or back of the cotyledons (incumbent).

A large Order, abounding in all temperate countries, especially of Europe and Asia. Most of the New Zealand genera are British. Properties stimulant and antiscorbutic. The Mustard, Shepherd’s-purse, Radish, Turnip, Cabbage, etc., all belong to this Order, and are found as escapes from cultivation.

\* *Pod long and narrow (often short in Nasturtium).*

Pod terete, stout, curved. Seeds in 2 rows. Flowers yellow . . .	1. NASTURTIIUM.
Pod somewhat 4-gonous. Seeds in 1 row. Flowers yellow . . .	2. BARBAREA.
Pod terete, slender. Seeds in 1 row . . .	3. SISYMBRIUM.
Pod flat. Valves elastic. Seeds in 1 row. Flowers white . . .	4. CARDAMINE.

\*\* *Pod short and broad.*

Pod with convex or keeled valves . . .	5. BRAYA.
Pod with much-flattened, often winged, 1-seeded valves . . .	6. LEPIDIUM.
Pod with much-flattened, often winged, many-seeded valves . . .	7. NOTOTHLASPI.

1. **NASTURTIIUM**, Br.

Branching herbs, with usually yellow flowers and cut leaves.—Sepals spreading. Petals with short claws, yellow, sometimes 0. Stamens 6 or fewer. Pod subcylindric, usually curved; valves membranous, concave, many-seeded. Seeds in 2 series in each valve, minute, turgid; cotyledons accumbent.

A large British genus, of which the Watercress (*N. officinale*) is a white-flowered species, abundantly naturalized in rivers, etc.

1. **N. palustre**, DC.—*N. terrestre*, Br.; *Fl. N. Z.* i. 14. A suberect, glabrous or pilose, branching herb, with entire or pinnatifid leaves, auricled at the base, the lobes sinuate-toothed. Flowers on slender pedicels, small.

Petals hardly longer than the calyx. Pods turgid, oblong, as long as or shorter than their pedicels, curved.

**Northern** and **Middle** Islands, not uncommon in moist places. I have adopted the name *palustre* for this plant, because it is that used in most Continental works, and in Bentham's Australian Flora, but that of *terrestre* has equal claims to be retained. A very widely distributed plant in both the Old and New World; a state with almost entire leaves, *N. semipinnatifidum*, Hook., sometimes occurs.

## 2. BARBAREA, Br.

Stout or slender, erect, leafy, glabrous herbs, usually with angled stems, and pinnate or pinnatifid leaves.—Sepals suberect. Petals clawed, yellow. Pods erect, elongate, compressed, 4-gonous, with keeled or costate, straight, coriaceous, many-seeded valves. Seeds oblong, in one series; cotyledons accumbent.

A common European genus, of which one species was cultivated in former times in Britain as a pot-herb. The New Zealand species, which is also Australian, seems to be quite the same as the British, which is very variable.

1. **B. vulgaris**, Linn.—*B. australis*, Hook. f. Fl. N. Z. i. 14. Erect, rather rigid, stout, leafy, 1–2 ft. high, with green, furrowed stems. Lower leaves lyrate-pinnatifid; lobes obovate-oblong, terminal ovate and sinuate. Upper leaves entire, sinuate or pinnatifid. Flowers rather large. Pods stout,  $1\frac{1}{2}$  in. long,  $\frac{1}{10}$ – $\frac{1}{6}$  in. broad, erecto-patent, broader than their terete pedicels; valves veined; style short, straight.

**Northern** Island, *Colenso*. This, the “Toi” of the natives, was formerly used by them as food.

## 3. SISYMBRIUM, Linn.

Herbs, usually leafy with slender stems and small white or yellow flowers.—Sepals suberect or spreading. Petals clawed. Pod slender, terete or slightly compressed; valves concave, many-seeded. Seeds in one series in each cell, oblong.

A British genus, abundant in the north temperate zone, rare in the south.

1. **S. novæ-Zelandiæ**, Hook. f., n. sp. Tall, very slender, 1–2 ft. high, glabrous or covered with minute stellate pubescence. Leaves chiefly radical, spreading, 1–2 in. long, few or many and crowded, narrow-obovate or linear-oblong, sinuate-pinnatifid; lobes blunt. Flowering stems very slender, sparingly branched, with few entire or toothed linear leaves. Flowers small, white. Petals narrow. Sepals erect. Pods  $\frac{1}{2}$ –2 in. long,  $\frac{1}{15}$  in. broad, very narrow, linear, obtuse, glabrous, on slender pedicels; valves convex, 1-nerved. Seeds small. Cotyledons obliquely incumbent.

**Middle** Island: mountains of Nelson, *Rough*; Shingle slips, Wairau Gorge, alt. 4500 ft., *Travers*.

## 4. CARDAMINE, Linn.

Generally slender or small herbs, with entire or pinnate leaves, and small white flowers.—Sepals erect or spreading. Petals clawed or spatulate. Pod long, linear, compressed; valves flat, usually separating elastically and curving

backwards. Seeds numerous, forming one series in each cell, flattened; cotyledons accumbent.

A very extensive genus, especially in temperate regions. Common in England.

Stems slender. Leaves pinnate . . . . .	1. <i>C. hirsuta</i> .
Stem 0. Leaves spatulate . . . . .	2. <i>C. depressa</i> .
Stem stout, tall. Leaves sinuate-lobed . . . . .	3. <i>C. stylosa</i> .
Stem very short and stout. Leaves long, deeply toothed . . . . .	4. <i>C. fastigiata</i> .

1. **C. hirsuta**, Linn. ;—*Fl. N. Z.* i. 13. A very variable, slender, branched, rarely simple, glabrous or slightly hairy annual, 12–18 in. high, erect or decumbent, sometimes assuming a perennial rootstock, especially near the sea. Leaves pinnate; leaflets few, opposite or alternate, entire or lobed, orbicular oblong ovate or cordate, usually on slender petioles, sometimes reduced to one. Flowering branches sometimes reduced to capillary 1-flowered scapes. Flowers small, white (sometimes 4-androus in Europe). Pods  $\frac{3}{4}$ –1 $\frac{1}{2}$  in. long, slender, on slender pedicels, obtuse or produced into acuminate styles. Seeds small, pale yellow-red.

Var. *a. debilis*. Erect or generally decumbent, much branched. Leaflets in several pairs, rounded or cordate. Pods very slender, with long slender styles.—*C. debilis*, Banks; *Sisymbrium heterophyllum*, Forst.

Var. *b. corymbosa*. Smaller in all its parts, with few-flowered corymbs. Leaflets 2 pairs. Pods with short styles.—*C. corymbosa*, Fl. Antarct. i. 6; Hook. Ic. Pl. t. 686.

Var. *γ. subcarnosa*, Fl. Antarct. i. 5. Erect, rather fleshy, with stout branches and petioles. Leaflets in several pairs, obovate or oblong. Flowers numerous, larger, in a dense corymb. Styles very short, stout.

Var. *δ. uniflora*. Very small, the leaves reduced to 1 pinnule, and the stem to a 1-flowered scape.

Abundant throughout the islands, in all situations, especially moist or shady, *Banks and Solander*, etc. Var. *a*, the most frequent; var. *b*, in woods; var. *γ*, a southern succulent form, found in **Campbell's** Island, and probably also in the Southern Island, and elsewhere; var. *δ*, rather a reduced state than a distinct race. A very common plant in all temperate and cold, and many warm parts of the world; the succulent forms are an excellent cress. In Britain and elsewhere in the northern hemisphere, this plant is an annual, in the more equable climate of the southern usually a perennial.

2. **C. depressa**, Hook. f. *Fl. Antarct.* i. 6. A glabrous or pilose stemless perennial. Leaves crowded, rosulate, 1–2 in. long, spatulate, entire or crenate, sinuate or lobulate, obtuse or retuse, narrowed into long or short petioles. Flowering stems  $\frac{1}{4}$ –4 in. high, erect or ascending, few-flowered. Flowers small, white. Pods  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long, erect, rather stout; styles short, stout.

Var. *a. depressa*. Glabrous, larger. Leaves entire or lobulate.—*C. depressa*, Fl. Antarct. i. 6. t. 3 and 4 B.

Var. *b. stellata*. Pilose, smaller. Leaves nearly quite entire.—*C. stellata*, Hook. f.; Fl. Antarct. i. 7. t. 4 A.

**Middle Island**: var. *a*, Lake Tennyson and Wairau mountains, alt. 4–5000 ft., *Travers*; Hopkins river, Lake Okau, etc., *Haast*; Otago, wet places in the Lake district, *Hector and Buchanan*. **Lord Auckland's** group and **Campbell's** Islands, *a* and *b*, abundant, *J. D. H.* I suspect that this will prove a reduced form of *C. hirsuta*, a Tasmanian variety of which plant approaches it in foliage.

3. **C. stylosa**, DC.—*C. divaricata*, Fl. N. Z. i. 19. Perennial?, tall, 2 to 3 ft. high, glabrous, stout, branched, leafy. Leaves 3 to 5 in. long, linear-spatulate or oblong, sagittate at the base, quite entire or toothed, or sinuate or lobed or almost pinnatifid at the base. Racemes elongated. Flowers



rather small, white. Pods stout,  $1-1\frac{1}{2}$  in. long, on horizontally spreading stout pedicels; valves concave; style stout,  $\frac{1}{2}$  in. long. Seeds brown, with impressed dots.—*Arabis gigantea*, Hook. Ic. Pl. t. 259.

**Northern Island**: Bay of Islands, *R. Cunningham*; near Auckland, *Lyall, Sinclair*. Seeds rather smaller and paler than in the Australian and Tasmanian plant; leaves in one specimen almost pinnatifid; but clearly, I think, the same species.

4. **C. fastigiata**, Hook. f.—*Arabis fastigiata*, Fl. N. Z. ii. 324. A glabrous perennial; rootstock a span long, perpendicular, tapering, fusiform, as thick as the little finger, densely clothed towards the apex with the recurved bases of the old leaves; branches ascending from the top of the rootstock amongst the leaves, 6–18 in. long, rather stout, leafy, simple or branched. Leaves densely rosulate at the apex of the rootstock, 2–3 in. long, narrow, lanceolate-spathulate, acute, coarsely inciso-serrate, very coriaceous; cauline less spathulate, narrower, with narrower serratures. Flowers very numerous, white, about  $\frac{1}{3}$  in. diam., on slender pedicels. Petals with narrow claws. Pods suberect, curved, narrow-linear,  $1\frac{1}{4}-2$  in. long,  $\frac{1}{10}$  in. broad, with acute ends and very short styles. Seeds (unripe) oblong, compressed, red-brown.

**Middle Island**: highest part of Macrae's run, *Munro*; river-bed of the Macaulay, alt. 3500 ft., *Haast*. In the New Zealand Flora, I referred this to *Arabis*, and it has equal claims to this genus and *Cardamine*; but its close affinity with *C. radicata*, of Tasmania, determines me to transfer it here.

#### 5. BRAYA, Sternberg.

Alpine, densely tufted, perennial herbs, with long tap-roots, rosulate radical leaves, and scapes bearing short few-flowered racemes or corymbs.—Flowers white pink or purplish. Sepals short, equal. Petals obovate. Stamens 6. Pod short, thick, ovate or oblong; valves convex, with a stout costa, or keeled; septum entire or open; style very short; stigma capitate. Seeds in 1 or 2 series; funicles very short; cotyledons incumbent.

An Arctic genus, also found, but rarely, in the loftiest alps of Europe, N. Asia, and N. and S. America.

1. **B. novæ-Zelandiæ**, Hook. f., n. sp. A very short, depressed, alpine herb, covered with stellate pubescence; root long, tap-shaped, as thick as the finger, bearing one or several equally thick, erect or ascending cylindric branches, covered with scars of old leaves and surmounted by a head of small imbricating leaves that spread out horizontally. Leaves  $\frac{1}{2}-\frac{1}{4}$  in. long, oblong, pinnatifidly lobed, narrowed into flat short petioles; those on the scapes with longer petioles, and a minute obovate blade, which is digitately lobed at the top. Scapes or peduncles very numerous, rising from the root below the leaves, shorter than these, and spreading horizontally, 3–5-flowered. Flowers not seen. Pods  $\frac{1}{8}-\frac{1}{5}$  in. long, about half as broad, laterally compressed; septum incomplete. Seeds 3–5 in each valve, obovoid.

**Middle Island**: Lake district, debris of schist on Mount Alta, alt. 5000 ft., *Hector and Buchanan*. A most remarkable plant; the pod is rather too much compressed for *Braya*, and approaches that of *Lepidium*.

#### 6. LEPIDIUM, Linn.

Herbs, sometimes with an almost woody stem, toothed or pinnatifid leaves, and white, sometimes unisexual flowers.—Stamens 4 or 6. Pods broad,

much flattened laterally, obtuse, winged or keeled at the back; cells 1-seeded. Cotyledons incumbent.

A large genus, common in England, and the N. and S. temperate zones generally. To this genus the garden "Cress" belongs, also *L. ruderale*, a common slender Australian and European much-branched annual, with linear leaves, which will probably soon be introduced into New Zealand.

Erect. Leaves more or less toothed or serrate . . . . . 1. *L. oleraceum*.  
Erect. Leaves pinnatifid . . . . . 2. *L. sisymbrioides*.  
Procumbent. Leaves pinnatifid . . . . . 3. *L. incisum*.

1. ***L. oleraceum*, Forst.**—*Fl. N. Z.* i. 15. Suberect, perennial, glabrous, 10–18 in. high; stem stout, woody, scarred, branched, smelling disagreeably when bruised. Leaves obovate-cuneate or oblong-spathulate, 1–3 in. long, lower serrate, upper more entire. Flowers numerous, small, 4-androus. Pods on slender spreading pedicels, ovate, subacute,  $\frac{1}{6}$  in. long, not winged at the back.—A. Rich. *Flora*, t. 35.

Abundant on the shores throughout the islands, *Banks and Solander*; Otago, Lake district, Waitaki valley, *Hector and Buchanan*, a small-leaved form. **Lord Auckland's** group, *Bolton*. Not found in other countries.

2. ***L. sisymbrioides*, Hook. f., n. sp.** Erect, glabrous, slender, a span high; root woody, spindle-shaped, branching out into several heads at the top. Stems very numerous, slender, flexuose, sparingly branched, leafy. Leaves small,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, linear, pinnatifid; segments small, short,  $\frac{1}{2}$  in. long, entire toothed or lobulate. Flowers small, in terminal racemes; petals white; pedicels slender. Pods on spreading curved slender pedicels,  $\frac{1}{6}$  in. long, broadly subquadrate-ovate, acute at both ends, not winged at the back, notched at the apex.

**Middle Island:** Dry Grass flats, Lake Okau, alt. 2000 ft., *Haast*; Otago, grassy plains, Waitaki valley, *Hector and Buchanan*; possibly a form of *L. incisum*.

3. ***L. incisum*, Banks and Sol.**—*Fl. N. Z.* i. 15. Glabrous or pilose, much branched, prostrate; root stout, perennial, woody; branches sparingly leafy, a span long, ascending at the tips. Lower leaves on long petioles, 2–3 in. long, pinnatifid, with 4–6 pairs of spreading or recurved bluntly-toothed lobes, the upper entire or toothed at the tip, broadly cuneate. Flowers in small, axillary or terminal, few-flowered racemes. Petals 0 in my specimens. Stamens 4, glands of the disk 6 or 8, elongated. Pods ovate-cordate, notched at the apex,  $\frac{1}{8}$  in. long, half as long as the slender pedicels.

**Northern Island.** Opuraga, on the beach, rare, *Banks and Solander*; Port Nicholson, on rocks near the sea, *Colenso*. **Middle Island.** Limestone rocks in the subalpine region of Waimakeriri, alt. 2000 ft., *Haast*. I have described the habit, foliage, inflorescence, etc., of this plant, from Banks and Solander's specimen and drawing; Mr. Haast's being very young and apparently dwarfed.

## 7. NOTOTHLASPI, Hook. f.

Herbs, with numerous spathulate, thick, radical leaves.—Flowers rather large, white. Sepals erect. Pods very much flattened; valves winged; cells very many-seeded. Seeds on very slender funicles; radicle incumbent, sometimes very long.

A genus confined to New Zealand.

Scape very stout. Style very short . . . . . 1. *N. rosulatum*.  
Stem usually much branched at the base. Style long . . . . . 2. *N. australe*.

1. **N. rosulatum**, *Hook. f., n. sp.* A very stout, erect, densely leafy, pyramidal, fleshy herb. Stem 0, or very short. Leaves very numerous and most densely crowded, imbricated, forming a rosette, spatulate, petioled, crenate, when young covered with weak cellular hairs, glabrous when old. Scape often thicker than the finger, a span high, bearing a profusion of white sweet-scented flowers. Pods  $\frac{1}{2}$ –1 in. long, obovate, with a very short style. Seeds rather large, with a thin pitted testa; radicle very long, often twice folded, first upwards, then downwards and backwards over the back of the cotyledons.

**Middle Island**: alt. 3500 to 6500 ft.; shingle beds on the Ribbon range, Mount Torlesse and Waimakeriri valley, *Sinclair and Haast*; Wairau valley, *Maling, Travers*; Lake Tennyson, *Rough*. A most singular plant.

2. **N. australe**, *Hook. f.*—*Thlaspi* (?) *australe*, Fl. N. Z. ii. 325. A small, perennial, densely tufted, much branched (rarely simple), glabrous plant, with short leafy branches, and very numerous white corymbose flowers; roots slender, fusiform, descending deeply; branches 1–2 in. long. Leaves cauline and radical, petiolate,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long, spatulate-oblong or linear-spatulate, subacute, entire or crenate, coriaceous or fleshy, often recurved. Flowers white, scentless, in many-flowered corymbs, almost involucre by the numerous cauline leaves, about  $\frac{1}{4}$  in. diam., on pedicels  $\frac{1}{3}$ –1 in. long. Young pods obovate, retuse, with long stout styles; valves winged. Seeds excessively numerous.

**Middle Island**: top of Gordon's Nob, Upper Wairau river, and elsewhere in the Nelson Province, alt. 4–5000 ft., *Munro, Sinclair, Travers, Haast*.

The most frequent naturalized *Cruciferae* known to me in New Zealand are all common British weeds, except *Alyssum maritimum*, mentioned by A. Cunningham, but which is not fully naturalized.

*Capsella Bursa-pastoris*, Linn. (Shepherd's-purse). An annual, with spreading rosulate pinnatilobed radical leaves, simple or branched scapes, many small white flowers, an obcuneate or orbiculate retuse flat pod, the valves not winged, and cells many-seeded.

*Senebiera pinnatifida*, DC. A much branched, prostrate, glabrous, leafy annual, with bipinnatifid irregularly-cut leaves, short leaf-opposed racemes of very small, white flowers, succeeded by very small, didymous, wrinkled, indehiscent, 2-celled, 2-seeded pods. *S. Coronopus*, Poir., with subacute, crested pods, is also found.

Watercress, *Nasturtium officinale*, Linn., is a pest in the rivers about Canterbury, attaining a size never seen in Europe, and is found also abundantly elsewhere.

The Cabbage, *Brassica oleracea*, Linn., Turnip, *B. campestris*, Linn., Cress, *Lepidium sativum*, Linn., Charlock, *B. Sinapistrum*, Boiss., Horseradish, *Cochlearia Armoracia*, Linn., Radish, *Raphanus sativus*, and probably various others, occur as escapes from fields and gardens.

I have an indifferent specimen of a Cruciferous (?) plant, gathered by Haast, on terraces near Lake Okau, which I am unable to refer to any genus; it is a slender branched herb, pubescent, with simple hairs; small pinnate leaves; leaflets in 1 to 2 pairs, rounded, entire or lobed; and minute white flowers, that seem to be in an imperfect condition.

#### ORDER IV. VIOLARIÆ.

Herbs or shrubs, with alternate stipulate leaves. Flowers regular or irregular.—Sepals 5, imbricate. Petals 5, imbricate. Stamens 5, hypogynous; anthers sessile or on short filaments, often united, the connective usually expanded upwards or provided with an appendage at the back, or both. Ovary

with 2 to 5, parietal placentas, and one style. Fruit a capsule or berry. Embryo axile in fleshy albumen.

A large Order, widely distributed through tropical and temperate regions.

Petals spreading. Anthers united. Capsule 3-valved. . . . . 1. *VIOLA*.  
 Petals small. Anthers free. Berry with 3 or 6 placentas . . . . 2. *MELICYTUS*.  
 Petals small. Anthers connate. Berry with 2 placentas. . . . . 3. *HYMENANTHERA*.

### 1. *VIOLA*, Linn.

Herbs, with trailing stems or short woody stocks. Leaves alternate, petioled, stipulate. Flowers irregular.—Sepals 5, produced at the base. Petals unequal, spreading, lowermost often larger, spurred or gibbous at the base. Anthers 5, connective flat, produced into a thin membrane, the lower often spurred. Style capitate. Capsule 3-valved, with a parietal placenta on each valve.

A large British and widely-diffused genus in all temperate climates, of which several species produce two forms of flowers; the larger peduncled, with large petals, that often ripen few seeds; and minute ones lower down, apparently imperfect, with reduced petals or 0, that ripen abundance of seed.

Stems slender. Leaves cordate. Stipules and bracts lacerate . . . . . 1. *V. filicaulis*.  
 Stems slender. Leaves cordate. Bracts entire . . . . . 2. *V. Lyallii*.  
 Stems short. Leaves ovate. Bracts entire . . . . . 3. *V. Cunninghamii*.

1. *V. filicaulis*, Hook. f. *Fl. N. Z.* i. 16. Very slender, perfectly glabrous. Stems filiform, prostrate or creeping. Leaves alternate, orbicular-cordate or broadly ovate-cordate, obtuse or acute, obtusely crenate; petioles 1–3 in. long; stipules lacerate, the teeth filiform, tipped with a gland. Peduncles very slender, 1-flowered; bracts subulate, more or less lacerate like the stipules. Flowers very pale blue,  $\frac{1}{4}$ – $\frac{2}{3}$  in. diam. Sepals linear-lanceolate, acuminate. Spur very short.

**Northern** and **Middle** Islands: as far south as Otago, in various localities, abundant. Very near the *V. serpens* of India.

2. *V. Lyallii*, Hook. f., n. sp.—*V. Cunninghamii*, var.  $\gamma$ , *Fl. N. Z.* i. 16. Entirely similar in most respects to *V. filicaulis*, but the stipules and bracts are generally more green, and always entire, usually obtuse, and the flowers are smaller.

**Northern** Island: in various places, *Sinclair*, *Colenso*. **Middle** Island: Nelson, *Travers*; Canterbury, *Lyall*. In the N. Z. Flora I regarded this as a cordate-leaved variety of *V. Cunninghamii*, but more specimens have convinced me of its distinctness. Closely allied to the Australian *V. Caleyana*, but smaller in all its parts, and with less deeply cordate leaves.

3. *V. Cunninghamii*, Hook. f. *Fl. N. Z.* i. 16. Very variable in size, glabrous. Stem short, much branched, often thickened into a short woody stock. Leaves tufted on the top of the root or stem, or on very short branches from it, ovate ovate-oblong or triangular-ovate, narrowed into the petiole, obtuse, obscurely crenate; petioles often 4 in. long; stipules broadly adnate to the base of the petiole, slightly lacerate or entire. Peduncles slender; bracts linear, obtuse, quite entire. Flowers  $\frac{1}{3}$ – $\frac{2}{3}$  in. diam., pale blue. Sepals linear-oblong, obtuse.—*Erpetion spatulatum*, A. Cunn., not Don.

Very common in moist places, from the middle of the **Northern** Island southwards, ascending to 5000 ft. **Middle** Island: Hopkins river and Lake Okau, *Haast*; Wairau mountains, *Travers*; Otago, *Hector* and *Buchanan*. Also found in Tasmania.



## 2. MELICYTUS, Forst.

Shrubs, with short-petioled, toothed, minute-stipuled leaves. Flowers axillary, fascicled, small, regular, almost unisexual or polygamous. Sepals 5. Petals 5, short, spatulate, spreading. Anthers 5, free; connective produced into a membrane, and furnished with a scale at the back. Style 3-6-fid, or with a discoid stigma. Berry with few or many angled seeds, on 3 to 6 placentas.

This genus is confined to New Zealand and Norfolk Island.

Leaves oblong or oblong-lanceolate, serrate . . . . .	1. <i>M. ramiflorus</i> .
Leaves large, obovate, sinuate-serrate . . . . .	2. <i>M. macrophyllus</i> .
Leaves long, linear-lanceolate, sharply serrate . . . . .	3. <i>M. lanceolatus</i> .
Leaves small, orbicular-ovate, sinuate . . . . .	4. <i>M. micranthus</i> .

1. ***M. ramiflorus*, Forst.**;—*Fl. N. Z.* i. 18. A glabrous, white-barked, small tree or large shrub, 20-30 ft. high; trunk often angular, and 7 ft. in girth (*Buchanan*); branches brittle. Leaves alternate, 4-5 in. long, oblong-lanceolate, acuminate, serrate with small obtuse teeth, sometimes obscurely so; petioles slender; stipules deciduous. Flowers small, in fascicles on the branches; peduncles slender,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, with 2 minute bracts. Flowers minute,  $\frac{1}{8}$  in. diam. Calyx-lobes obtuse, spreading, green. Anthers obtuse; stigma almost sessile, 6-lobed. Berry small,  $\frac{1}{8}$  in. diam.

Abundant throughout the islands, as far south as Otago, *Banks and Solander*, etc. Leaves eaten greedily by cattle; wood soft, useless (*Buchanan*). Also found in Norfolk Island.

2. ***M. macrophyllus*, A. Cunn.**;—*Fl. N. Z.* i. 19. A large glabrous bush, 4-7 ft. high; bark pale-brown. Leaves 3-4 in. long, obovate or elliptical-oblong, acute, coarsely and distantly (rarely closely) sinuate-serrate, more coriaceous and broader than in *M. ramiflorus*; stipules deciduous. Flowers twice as large as in the former, in fascicles of 4 or 6 on the branches; peduncles stout,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, much decurved, with small, broad, opposite bracts close to the flower. Calyx-lobes short, broad, rounded. Anthers apiculate. Stigma broad, nearly sessile, discoid, lobed. Berries  $\frac{1}{4}$  in. diam.

**Northern Island**: about the Bay of Islands only, so far as is hitherto known, *A. Cunningham*, etc. Easily distinguished from *M. ramiflorus* by the coarser habit, broader, more obovate, coriaceous leaves, fewer stout, decurved pedicels, with bracts at the apex, and larger flowers and berries.

3. ***M. lanceolatus*, Hook. f.** *Fl. N. Z.* i. 18. t. 8. A slender shrub or small tree, 10-12 ft. high; branches brittle; bark dark-brown. Leaves 4-7 in. long, narrow linear-lanceolate, acuminate, sharply erose-dentate, rather membranous. Flowers small, 2 or 3 together; pedicels short, decurved, bracteate above the middle. Calyx-lobes oblong. Petals erect, with spreading limb. Connective produced into a subulate point. Style long, 3-fid. Berry oblong,  $\frac{1}{6}$  in. diam.

**Northern Island**: forests at Patea on the east coast, *Colenso*.

4. ***M. micranthus*, Hook. f.** *Fl. N. Z.* i. 18. A small, rigid shrub; branches tortuous, covered with grey or brown bark, the youngest pubescent at the tips. Leaves small and scattered,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, orbicular-obovate, obtusely sinuate, the youngest often obovate-oblong and pinnatifid; petioles very short, puberulous. Flowers unisexual, very minute, axillary; pedicels

very short, curved, bracteate at the base. Calyx obtusely and shortly 4-lobed; lobes broad, ciliated. Petals small, orbicular. Anthers rounded, didymous, sessile. Ovary flagon-shaped; style short; stigma 4-lobed. Berry minute, as small as a mustard-seed, about 3-seeded.—*Elæodendron micranthus*, Hook. f. in Lond. Journ. Bot. iii. 228. t. 8.

**Northern** Island: east coast and interior, *Colenso*. **Middle** Island: Nelson, *Bidwill*. A plant of very different habit and appearance from the preceding species.

### 3. HYMENANTHERA, Br.

Woody shrubs, with alternate or fascicled, entire or toothed, minutely stipuled leaves, and small axillary, solitary, fascicled, sometimes unisexual flowers.—Sepals 5. Petals 5, short. Anthers sessile, connate; connective produced into a membrane, and furnished with a scale at the back. Style short, with a 2-lobed stigma. Berry small, with 2 or few globose seeds on 2 placentas.

A small genus, native also of Norfolk Island, Tasmania, and South-eastern Australia, the species are very variable in foliage.

1. **H. crassifolia**, Hook. f. *Fl. N. Z.* i. 17. t. 7. A small shrub, 2–4 ft. high, with rigid, stout, tortuous branches, rarely sending out straight shoots; branchlets pubescent; bark white. Leaves very variable, thickly coriaceous, common form linear-spathulate, 2–3 in. long, but on young shoots often larger, broader, sinuate or toothed, and in older shorter, obtuse, veined when dry; petioles short; stipules very minute and deciduous. Flowers very small, solitary or few together, axillary; pedicels short, stout, curved, with one concave appressed bract. Sepals orbicular, erose or ciliolate. Petals linear-oblong. Anthers recurved, connate into a membranous lobed tube, the lobes ciliolate. Berries  $\frac{1}{4}$  in. diam., blue-purple.

**Northern** Island: maritime rocks opposite the Cavallos Islands, *A. Cunningham*; Cape Palliser, *Colenso*. **Middle** Island: Nelson, *Bidwill*, *Travers*.

## ORDER V. PITTOSPOREÆ.

Shrubs or trees, with alternate or whorled, exstipulate, evergreen leaves and regular flowers.—Sepals 5, imbricate. Petals 5, with long, erect claws and spreading limbs, imbricate. Stamens 5, free, hypogynous, erect, with oblong or sagittate anthers. Ovary 1 or 2, rarely 3–5-celled (often imperfectly), with a short or long style; ovules many, placentas attached to the septa. Capsule usually bursting by woody valves, which bear the placentas on the middle. Seeds with a minute embryo in hard albumen.

Rather a small Order, abounding in Australia; represented only by *Pittosporum* in India and its islands, the Pacific, and Africa: absent in America.

### 1. PITTOSPORUM, Linn.

Flowers often polygamous. Sepals free. Petals usually recurved. Filaments subulate. Ovary perfectly or imperfectly 2–5-celled. Capsule woody or coriaceous. Seeds immersed in a transparent gluten.

*Leaves alternate. Flowers solitary or 2-nate, axillary.*

- |   |                            |
|---|----------------------------|
| Leaves 1-2 in., oblong, entire. Peduncles as long as calyx, pubescent . . . . . | 1. <i>P. tenuifolium</i> . |
| Leaves 1-2 in., oblong, entire. Peduncles very short, glabrous . . . . .        | 2. <i>P. Colensoi</i> .    |
| Leaves 1-1½ in., linear-obovate, serrate, blunt, very coriaceous . . . . .      | 3. <i>P. patulum</i> .     |
| Leaves 1 in., narrow, linear-lanceolate, entire . . . . .                       | 4. <i>P. reflexum</i> .    |
| Leaves ½ in., linear- or obovate-oblong, very coriaceous . . . . .              | 5. <i>P. rigidum</i> .     |
| Leaves ½ in., broadly rounded-obovate or obcordate . . . . .                    | 6. <i>P. obcordatum</i> .  |

*Leaves alternate. Flowers fascicled or corymbose or paniced.*

- |   |                             |
|---|-----------------------------|
| Leaves glabrous. Flowers in axillary and terminal dense fascicles . . . . . | 7. <i>P. fasciculatum</i> . |
| Leaves tomentose below. Flowers in terminal umbels . . . . .                | 8. <i>P. crassifolium</i> . |
| Leaves glabrous. Flowers in terminal umbels . . . . .                       | 9. <i>P. umbellatum</i> .   |
| Leaves glabrous. Flowers in terminal branched panicles . . . . .            | 10. <i>P. eugenioides</i> . |

*Leaves whorled.*

- |   |                             |
|---|-----------------------------|
| Leaves 1-2 in., elliptic-lanceolate . . . . . | 11. <i>P. cornifolium</i> . |
| Leaves ½-1 in., linear-oblong . . . . .       | 12. <i>P. pimelioides</i> . |

1. ***P. tenuifolium***, *Banks and Sol.*;—*Fl. N. Z.* i. 21. A bush or small tree, 20-40 ft. high, with slender trunk; young shoots and leaves often pubescent. Leaves 1-2 in. long, broadly oblong or elliptic-obovate, obtuse, acute or acuminate, quite entire, undulate, rather membranous, glabrous or pubescent on the midrib; petiole short. Flowers axillary, solitary, on curved pubescent peduncles as long or longer than the calyx, variable in size, ¼-⅔ in. long. Sepals very variable in form and shape, from broadly ovate to linear-oblong, silky or glabrous. Petals dark-purple. Ovary pubescent. Capsule size of a small nut, usually 3-valved, broadly obovoid, downy when young, glabrous and rugose when old.—*Trichilia monophylla*, *A. Rich.* *Flora*, t. 34 bis.

Abundant throughout the east coasts of the islands, as far south as Otago, *Banks and Solander*, etc. "Wood worthless for any purpose," *Buchanan*.

2. ***P. Colensoi***, *Hook. f. Fl. N. Z.* i. 22. A small tree, very closely allied to *P. tenuifolium*, if not a variety of it, but the leaves are smaller, more acute and coriaceous, and not undulated; the peduncles shorter than the sepals, both of which are always glabrous; and the scarious bracts at the base of the peduncle are very persistent. The fruit also is smaller and rounder.

**Northern** Island: east coast and interior, *Dieffenbach, Colenso*. More specimens are much wanted to clear up this species, of which some specimens have almost the undulate, obtuse leaves of *P. tenuifolium*. Dr. Lyall's Chalky Bay specimens, in fruit only, referred here in the *Fl. N. Z.*, I now think are more probably *P. fasciculatum*.

3. ***P. patulum***, *Hook. f., n. sp.* Branches stout, glabrous; branchlets puberulous. Leaves patent or recurved, 1-1½ in. long, ⅓ in. broad, very narrow, linear-oblong, narrowed at the base, obtuse, crenate-serrate, very coriaceous and shining. Fruit globose or broader than long, woody, ⅓ in. diam., compressed, on a short, stout, axillary peduncle.

**Middle** Island: Wairau mountains, alt. 5000 ft., *Sinclair*. I have but one, and that a fruiting specimen, of this most distinct-looking species.

4. ***P. reflexum***, *R. Cunn.*—*P. pimelioides* γ, *Fl. N. Z.* i. 25. A small, slender, much-branched shrub, 2-3 ft. high, with almost filiform, silky-pubescent twigs. Leaves numerous, patent or recurved, very slender, linear-lanceolate, acuminate, membranous, quite entire, ¾-1¼ in. long, ⅓ in. broad.

Flowers not seen. Peduncles solitary, terminal; short, curved, pilose, 1-2-flowered. Ovary hirsute. Capsule ovoid, acuminate,  $\frac{1}{3}$  in. long, compressed, 2-valved; valves with the tips recurved.—*P. radicans*, R. Cunn.

**Northern** Island: thickets at Wangaroa, *R. Cunningham*; Bay of Islands, *J. D. H.*; east coast?, *Edgerley*. In the N. Z. Flora I regarded this as a variety of *P. pimeleoides*, from which it differs in the much narrower, acuminate, not whorled leaves; but more specimens are requisite to describe it fully.

5. ***P. rigidum***, *Hook. f. Fl. N. Z. i. 22. t. 10.* A rigid, much-branched shrub; branches tortuous, woody, stout, spreading. Leaves small, shining, in young branches sinuate-dentate or pinnatifid, in the older narrow-obovate, cuneate, elliptical or oblong,  $\frac{1}{2}$  in. long, shortly petioled, very thick and coriaceous, margin recurved. Flowers axillary, solitary; pedicels short, downy. Calyx? Petals dingy-purple, nearly as long as the leaves. Capsules small,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, broadly ovoid, acute, compressed, pilose, 2-valved, many-seeded.

**Northern** Island: mountains, near the Waikare lake and Ruahine mountains, *Colenso*.

**Middle** Island: mountains of Nelson, *Bidwill*. The calyx is absent in all my specimens.

6. ***P. obcordatum***, *Raoul, Choix, 25. t. 26;—Fl. N. Z. i. 23.* A shrub or small tree, glabrous, with divaricating, rather slender branches; bark pale. Leaves small,  $\frac{1}{3}$  in. long, remote, or 2 or 3 together, rounded or obcordate, sinuate, crenate or quite entire, suddenly contracted into a very short petiole, rather coriaceous; nerves obscure. Flowers  $\frac{1}{4}$  in. long, solitary or two together, on short puberulous peduncles, white. Sepals very slender, subulate. Petals narrow-linear. Ovary pubescent. Fruit unknown.

**Middle** Island: shady woods, near Akaroa, *Raoul*.

7. ***P. fasciculatum***, *Hook. f. Fl. N. Z. i. 24.* A branching bush, with glabrous leaves and branches, and inflorescence tomentose. Leaves alternate, coriaceous, obovate-oblong or oblong-lanceolate, acute, quite entire, pale beneath; petioles  $\frac{1}{3}$  in. long. Flowers densely fascicled, axillary and terminal, sometimes collected at the base into a short cyme, together with the linear bracts and calyx densely tomentose; peduncles  $\frac{1}{4}$ – $\frac{1}{3}$  in. long. Sepals ovate-lanceolate. Petals linear-oblong, deep purple,  $\frac{1}{3}$  in. long. Capsule on a curved pedicel,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, like that of *P. tenuifolium*, 2-3-valved.

**Northern** Island: Lake Taupo, *Colenso*. **Middle** Island: Chalky Bay, *Lyall*; Otago, Lake district, not common, *Hector and Buchanan*. Very closely allied to *P. tenuifolium*, but the flowers are densely fascicled, almost villous, and the leaves rather longer and more like those of *P. Colensoi*. Dr. Lyall's and Hector's specimens, which are in fruit only, have the foliage more like *P. tenuifolium*.

8. ***P. crassifolium***, *Banks and Sol.;—Fl. N. Z. i. 23.* A shrub or small tree; branches erect; twigs, leaves below, petioles and inflorescence densely clothed with a thick white or buff tomentum. Leaves alternate, narrow-obovate or linear-obovate or oblong, obtuse, quite entire, 2-3 in. long, very coriaceous, margins recurved. Inflorescence terminal, usually a peduncled, simple umbel, sometimes reduced to a fascicle or a single flower; bracts broadly ovate, ciliate, imbricate. Flower nearly  $\frac{1}{2}$  in. long. Sepals linear-oblong, with white tomentum. Petals narrow, deep-purple. Capsule very variable in size, nearly globose, 2-4-lobed and -valved, downy.

**Northern** Island: not uncommon, *Banks and Solander*, etc.



9. **P. umbellatum**, *Banks and Sol.*;—*Fl. N. Z.* i. 24. A small tree, 20–30 ft. high, everywhere glabrous, except the under sides and petioles of the young leaves, peduncles, and calyces, which are covered with silky fulvous hairs; branches whorled. Leaves alternate, coriaceous, bright green, 2–3 in. long, obovate- or lanceolate-oblong, obtuse or acute, quite entire, narrowed into petioles  $\frac{1}{3}$ – $\frac{1}{2}$  in. long. Flowers numerous, rather large, nearly  $\frac{1}{2}$  in. long, in terminal umbels or corymbs. Peduncles slender, 1 in. long. Sepals ovate-lanceolate. Petals linear-oblong, obtuse. Ovary pubescent. Capsule rounded, 4-lobed, size of a hazel-nut, 2-valved; valves woody, granulated on the surface.

**Northern** Island: common about the Bay of Islands and elsewhere, *Banks and Solander*, etc.

10. **P. eugenioides**, *A. Cunn.*;—*Fl. N. Z.* i. 23. A small, branching tree, 20–30 feet high, everywhere quite glabrous, except the inflorescence and at times the youngest leaves, which may have a few scattered silky hairs; branches often whorled. Leaves 2–4 in. long, usually elliptical, acute, narrowed into long petioles, rarely broader and obovate, quite entire, undulated or crisped, rather coriaceous, with numerous fine veins. Flowers  $\frac{1}{4}$ – $\frac{1}{3}$  in. diam., fragrant, diœcious (more or less), males with large anthers and longer filaments, collected in branched, many-flowered corymbs, with diverging, slender peduncles and pedicels; bracteoles setaceous. Sepals very variable, ovate, acuminate, glabrous. Petals narrow and spreading, recurved. Capsules numerous, small,  $\frac{1}{4}$  in. long, ovoid, acute, glabrous, 2–3-valved:—*P. elegans*, Raoul, Choix, 25; *P. microcarpum*, Putterlich.

Common on the east coast throughout the islands, as far south as Otago, *Banks and Solander*, etc. “Bark white, resinous; wood white, soft, worthless, even for firewood,” *Buchanan*.

11. **P. cornifolium**, *A. Cunn.*;—*Fl. N. Z.* i. 23. A small slender shrub, 2–4 ft. high, with forked or whorled branches, everywhere glabrous, except the young shoots and inflorescence, which present a few long silky hairs. Leaves 1–2 in. long, whorled, obovate or elliptic-lanceolate, shortly petioled, quite entire and glabrous, coriaceous. Flowers polygamous, on very slender, terminal, 1–2-flowered peduncles, dingy red,  $\frac{1}{3}$  in. long; peduncles pilose, of the males  $\frac{1}{2}$ –1 in., female  $\frac{1}{4}$ – $\frac{1}{2}$  in. long. Sepals very narrow, subulate. Petals as narrow, with slender tips. Capsule  $\frac{1}{2}$  in. long, broadly oblong or obovate, compressed; valves yellow inside, coriaceous. Seeds large.—*Bot. Mag. t.* 3161.

**Northern** Island: eastern and southern coasts, common, *Banks and Solander*, etc.: always (?) growing epiphytically on trunks of forest-trees.

12. **P. pimeleoides**, *R. Cunn.*;—*Fl. N. Z.* i. 25. A very slender, branched shrub, 3–5 ft. high; branches, young leaves, and inflorescence loosely pilose. Leaves spreading, whorled, 1 in. long,  $\frac{1}{3}$ – $\frac{1}{4}$  in. wide, rather membranous, linear-oblong, obtuse or acute, quite entire. Flowers small, terminal, solitary or few; peduncles 1-flowered, very slender,  $\frac{1}{4}$ –1 in. long. Sepals subulate. Petals very slender, yellow-red. Capsule small, quite like that of *P. reflexum*.—*P. crenulatum*, Putterlich, *Synops. Pittosp.* 15.

**Northern** Island: on dry hills at the Bay of Islands. I have restored the var. *reflexum*

of Fl. N. Z., as a different species, but with some doubts; better specimens are wanted of both.

## ORDER VI. CARYOPHYLLÆ.

Herbs, with opposite, quite entire or minutely serrulate leaves. Flowers hermaphrodite. Sepals 4 or 5, free or connate, imbricate. Petals 4 or 5 or 0, hypogynous or perigynous. Stamens 4, 5, 8, or 10, inserted with the petals, sometimes seated on or between the lobes of an annular disk. Ovary 1-celled, bearing many (rarely few) ovules on a free central or basal placenta; styles 2-5, free or connate, stigmatose at the apex or inner face. Capsule many-seeded, splitting into as many, or twice as many, valves as styles. Seeds with farinaceous albumen, and a usually curved terete embryo.

A very large Order, abounding in temperate and cold climates, of which a few foreign species are shrubby.

TRIBE I. **Sileneæ**.—*Sepals connate into a tubular calyx*.

Calyx turbinate or campanulate. Stamens 10. Styles 2 . . . . . 1. GYPSOPHILA.

TRIBE II. **Alsineæ**.—*Sepals free*.

Petals bifid. Styles 3. Stipules 0 . . . . . 2. STELLARIA.

Petals 0. Styles 4 to 5. Stipules 0 . . . . . 3. COLOBANTHUS.

Petals entire. Styles 3. Stipules scarious . . . . . 4. SPERGULARIA.

### 1. GYPSOPHILA, Linn.

Annual (or perennial) herbs, with small paniculate flowers.—Calyx more or less campanulate, 5-fid, usually 5-nerved. Petals 5, with a narrow claw, and entire or emarginate blade. Stamens 10, at the base of a small torus. Ovary many-ovuled; styles 2. Capsules ovoid or globose, 4-5-valved. Seeds laterally attached.

A large S. European genus, of which the following is the only representative in the southern hemisphere.

1. **G. tubulosa**, Boiss.;—*Fl. N. Z.* ii. 325. A small, much dichotomously-branched, glandular-pubescent annual, 4-5 in. high; stems slender, terete, erect. Leaves subulate, hardly acute, rigid. Peduncles slender, axillary, 1-flowered,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long, diverging in fruit. Flowers small,  $\frac{1}{8}$  in. long. Calyx tubular-campanulate, with 5 green ribs, 5-toothed. Petals narrow, linear, retuse or bifid, longer than the calyx. Capsule 5-valved at the tip, exerted. Seeds transversely rugose, with deep impressions.

**Northern Island**: east coast, Ahuriri, Raukawa, Cape Palliser, and Hawke's Bay, *Colenso*. **Middle Island**: Rangitata valley, *Sinclair and Haast*. Tarudale plain, 4000 ft., *Travers*. Moraines round Lake Okau, amongst grass, *Haast*; Otago, abundant everywhere in grassy plains, *Hector and Buchanan*. Not uncommon in South Australia, where it was discovered by Brown. Originally described from Asia Minor, and found nowhere but in that country, Australia, and New Zealand; it is worth observing whether it is rapidly increasing, for if so it is probably an importation.

### 2. STELLARIA, Linn.

Erect or decumbent herbs, annual (or perennial), with flat or acerose leaves, and axillary or fascicled white flowers. Sepals 5, spreading. Petals 5, bifid, or 0. Stamens 10 or fewer, hypogynous, or seated on an annular disk. Styles

3; ovules few or many. Capsule globose oblong or ovoid, splitting into 3 bifid or 6 valves. Seeds often muricate.

A very large genus in Britain, and the temperate and cold regions of both hemispheres generally.

Creeping. Leaves suborbicular. Sepals subulate . . . . .	1. <i>S. parviflora</i> .
Minute, creeping or ascending. Leaves oblong or linear . . . . .	2. <i>S. elatinoides</i> .
Decumbent. Leaves ovate or obovate. Sepals blunt . . . . .	3. <i>S. decipiens</i> .
Erect. Sepals very large. Leaves linear . . . . .	4. <i>S. Roughii</i> .
Erect, rigid. Leaves acerose, with recurved margins . . . . .	5. <i>S. gracilentia</i> .

1. ***S. parviflora***, *Banks and Sol.*;—*Fl. N. Z.* i. 25. A very slender, pale green, flaccid herb, with prostrate, wiry, creeping stems and branches, a span long and upwards, wholly glabrous except a few hairs on the petioles. Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, nearly orbicular, acute, rarely cordate at the base, longer than the petioles. Peduncles axillary, shorter than the leaves, 1–2-flowered, 2-bracteolate about the middle. Flowers minute,  $\frac{1}{12}$  in. diam. Sepals 5, subulate-lanceolate or oblong, acuminate, with white scarious margins. Petals 0 or 5, shorter than the petals. Stamens 5 or 10. Capsule as long or longer than the sepals, 6-valved to the middle. Seeds about 8, pale brown, deeply pitted and reticulated.

**Northern and Middle Islands**: not uncommon in woods, *Banks and Solander*, etc.; and ascending to 5000 ft. on the Wairau mountains, *Travers*. Allied to the Tasmanian *S. flaccida*.

2. ***S. elatinoides***, *Hook. f. Fl. N. Z.* i. 25. A very small, glabrous, tufted, pale-green herb. Stems  $\frac{1}{2}$ –1 in. long, erect or creeping, very slender or rather stout. Leaves  $\frac{1}{12}$ – $\frac{1}{5}$  in. long, oblong or linear, subacute, narrowed into a short petiole. Flowers  $\frac{1}{10}$  in. diam., axillary, solitary, sessile or on short peduncles, large for the size of the plant. Sepals ovate-lanceolate or subulate, acuminate, with white scarious margins. Petals 0. Stamens 5 or 10. Capsule globose, as long as the sepals, 6-valved to the middle. Seeds 2–6, large, grossly tubercled.

**Northern Island**: grassy banks on the east coast, Cape Kidnapper, Hawke's Bay, Lake Rotoatara, etc., *Colenso*. Closely allied to the Tasmanian *S. multiflora*, *Hook.*, but much smaller in all its parts, and with flowers sessile or almost so.

3. ***S. decipiens***, *Hook. f. Fl. N. Z.* i. 27. A glabrous, laxly tufted, weak, decumbent, pale green, branching herb. Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, ovate or obovate, acuminate, narrowed into a broad, somewhat ciliate petiole. Peduncles axillary, 1–3-flowered, 2-bracteolate in the middle, shorter or longer than the leaves. Flowers larger than in *S. parviflora* and *elatinoides*. Sepals oblong-ovate, obtuse or subacute, quite glabrous. Petals 0 or 5, small. Stamens variable.

**Lord Auckland's group and Campbell's Island**. The Northern Island plant without flower, referred here in *Fl. N. Z.*, is more probably a form of *S. parviflora*. Closely allied to the *S. media* of Europe, which is naturalized abundantly in some parts of New Zealand, but differing in the axillary 1-flowered peduncles, and absence of a pubescent line on the branches. Also allied to the Tasmanian *S. flaccida*, but the flowers are much smaller, peduncles short, and sepals glabrous and not acuminate.

4. ***S. Roughii***, *Hook. f., n. sp.* A short, much-branched, glabrous, succulent, erect or straggling green herb, 2–4 in. high. Leaves  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, fleshy, linear, acuminate, 1-nerved. Flowers large,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam., terminal,

solitary, on short, stout peduncles. Sepals very large, lanceolate, acuminate, with 3 thick nerves. Petals much smaller than the sepals. Capsule subglobose, much shorter than the sepals, 6-valved to the base. Seeds about 6, very large, pale brown, covered densely with long papillæ.

**Middle Island**: Nelson mountains, *Rough*; Mount Torlesse, on shingle beds, alt. 4-6000 ft., *Haast*; shingle slips, Wairau Gorge, alt. 4-6500 ft., *Travers*. A very singular species, easily recognized by its large green flowers, quite unlike any other in habit.

5. ***S. gracilenta*, Hook. f. Fl. N. Z. ii. 326.** A wiry, rigid, loosely-tufted species, with suberect, nodose, scabrid stems, 2-4 in. high, and very long peduncles. Leaves opposite, each node bearing also a small fascicle of leaves,  $\frac{1}{4}$  in. long, subulate or linear, curved, obtuse or acute, glabrous, shining, the margins revolute to the midrib, leaving a deep furrow between them. Peduncles axillary in the upper leaves, solitary, 1-flowered, 1-4 in. long, erect, wiry, 2-bracteolate in the middle. Flower  $\frac{1}{2}$  in. diam. Sepals linear-oblong, obtuse, with white, very broad, scarious margins. Petals 5. Capsule cylindric-oblong, much longer than the sepals, 6-valved to the base. Seeds 8 to 10, yellow-brown, densely covered with long papillose hairs.

**Middle Island**: Nelson, *Bidwill*; Tarnale, *Sinclair*, *Travers*; Kowai valley, *Haast*; Manuka Island, *Munro*; Lake Tennyson, alt. 4400 ft., *Travers*; Otago, alt. 2000 ft., *Hector and Buchanan*. A very peculiar species, at once recognized by its rigid, wiry habit, narrow leaves, and very long, erect, slender peduncles.

*S. media*, Sm., the common English "Chickweed," is naturalized in many parts of New Zealand, and in Lord Auckland's Island. It may be distinguished from its very near congener, *S. decipiens*, by the pubescent line on the stem and more panicle inflorescence. The seeds are black and tubercled.

### 3. COLOBANTHUS, Bartling.

Usually densely-tufted, rigid, green herbs, with subulate, opposite leaves, and solitary green flowers on short or long terminal scapes or peduncles.—Sepals 4 or 5, coriaceous, erect. Petals 0. Stamens 4 or 5, perigynous, alternate with the sepals. Styles 4 or 5, opposite the sepals. Capsule ovoid, many-seeded.

A southern genus, found only in Australia, New Zealand, the Andes of South America, and Antarctic regions.

Leaves hardly rigid, $\frac{1}{4}$ - $\frac{3}{8}$ in. with acute tips. Flower 4-merous . . .	1. <i>C. quitensis</i> .
Leaves rigid, long, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. with acicular tips. Flower 5-merous . . .	2. <i>C. Billardieri</i> .
Leaves very short, $\frac{1}{8}$ in., subulate, with acicular tips . . .	3. <i>C. subulatus</i> .
Leaves $\frac{1}{4}$ in., polished, subulate, with very long acicular points . . .	4. <i>C. acicularis</i> .
Leaves very short, $\frac{1}{8}$ in., linear, with obtuse tips . . .	5. <i>C. muscoides</i> .

1. ***C. quitensis*, Bartl.** A small, glabrous, perennial, much-branched, tufted, green herb, 1-2 in. high. Leaves chiefly radical,  $\frac{1}{4}$ - $\frac{3}{8}$  in. long, subulate, acute but not acicular (or very rarely so) at the tips, concave above, convex on the back, quite entire. Scapes longer or shorter than the leaves, usually very short. Flowers 4-merous,  $\frac{1}{3}$  in. long. Sepals ovate, blunt, rarely acicular at the tip.

**Middle Island**: Nelson mountains, *Travers*; clefts of rocks on the Kowai river, alt. 1500 ft., *Haast*. Except in the rather smaller leaves, I can find no distinction between this and the S. American plant, which is found along the Andes from Mexico to Cape Horn, and also in Amsterdam Island in the S. Indian Ocean. It is very nearly allied to *C. Bil-*



*lardieri*, but that is a more rigid plant, with 5-merous flowers and acicular tips to the leaves and sepals. I have an alpine Tasmanian state of *C. Billardieri*, with foliage and sepals of *C. quitensis*, but pentamerous flowers. I suspect all are varieties of one plant.

2. **C. Billardieri**, Fenzl;—*Fl. N. Z.* i. 27. A small, quite glabrous, often tufted plant, with numerous subulate, spreading or recurved radical leaves and long peduncles; rarely low, densely tufted, with shorter leaves and scapes. Leaves usually  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, like those of *C. quitensis*, but with acicular tips. Peduncles often 2 in. long. Flowers  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, green, usually 5-merous. Sepals ovate, with acicular apices, longer or shorter than the capsule.—*Spergula affinis*, Hook. Ic. Pl. t. 266; *S. apetala*, Labill. Fl. Nov. Holl. t. 142.

Common throughout the islands, especially in alpine or hilly districts, *Colenso*, etc. **Campbell's** Island, *J. D. H.* Small varieties closely resemble the preceding. Abundant in Victoria and Tasmania.

3. **C. subulatus**, Hook. f. *Fl. Antarct.* i. 13 and 247. t. 93. A small, moss-like, densely caespitose, perfectly glabrous plant, with subulate, rigid, shining leaves, forming tufts about 1 in. high. Leaves densely imbricated, about  $\frac{1}{8}$  in. long, with acicular points, grooved above, convex on the back. Peduncles very short. Flowers hidden amongst the leaves. Sepals 4 or 5, ovate-subulate, with acicular apices, rigid.

**Middle Island**: Awatere valley, and rocky places, Sinclair range, alt. 4000 ft., *Sinclair and Haast*; Otago, Lake district, *Hector and Buchanan*; **Campbell's** Island, *J. D. H.* Also found in the alps of Victoria, and abundantly in Antarctic America.

4. **C. acicularis**, Hook. f., *n. sp.* A small, moss-like, densely caespitose, shining, rigid, glabrous plant, forming tufts 1–2 in. high. Leaves densely imbricated all round,  $\frac{1}{4}$  in. long, like those of *C. subulatus*, but paler, more shining, much larger, and with much longer acicular points. Flowers almost sessile, shorter than the leaves. Sepals 5, like the leaves, longer than the capsule.

**Middle Island**: dry rocky places, Wairau Gorge, alt. 4–5500 ft, *Travers*; Otago, Lake district, abundant, *Hector and Buchanan*.

5. **C. muscoides**, Hook. f. *Fl. Antarct.* i. 14. A perfectly glabrous, moss-like, densely tufted, bright green plant, soft and rather flaccid in texture, forming large patches. Stems most densely matted. Leaves densely imbricated, patent, about  $\frac{1}{4}$  in. long, linear, obtuse, rather dilated at the base, green, soft. Peduncles extremely short. Flowers minute, sunk amongst the leaves, 4-merous. Sepals ovate-lanceolate, obtuse, concave, green.

**Lord Auckland's** group and **Campbell's** Island: rocks near the sea, *J. D. H.*

#### 4. SPERGULARIA, Persoon.

Spreading, dichotomously-branched, perennial herbs, with linear leaves, scarious stipules, and white or rose-coloured peduncled flowers.—Sepals 5, spreading. Petals 5, obtuse, or 0. Stamens 5 or 10, hypogynous. Ovary subglobose; styles 3. Capsule 3-valved. Seeds compressed, often winged.

A small British genus, of which species are scattered over many temperate and warm parts of the globe, especially near the sea, and in waste places.

1. **S. rubra**, Pers., var. *marina*.—*Arenaria media*, Linn.; *Fl. N. Z.* i. 26. A rather succulent, excessively-branched, prostrate or suberect, annual

herb, with perennial root, more or less pubescent with viscid down. Stems and branches terete, 1 in. to a span long. Leaves linear,  $\frac{1}{3}$ –1 in. long, quite entire. Flowers numerous, axillary and terminal, on long, slender peduncles,  $\frac{1}{2}$ –1 in. long, which are often patent or reflexed. Flowers very variable in size,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long. Sepals green with a white membranous border. Petals shorter than the sepals, sessile, often very pale. Stamens 5. Seeds with a broad membranous wing.

Common on the shore throughout the islands, *Banks and Solander*, etc. Also found under various forms in all temperate and many tropical localities.

There are several Caryophylleous weeds introduced into New Zealand, especially from Europe, besides the *Stellaria media*, mentioned under that genus; the chief of these are:—

*Polycarpon tetraphyllum*, Linn. A small, tufted annual, with opposite and 4-nate obovate or oblong leaves, small green flowers, 5 sepals, small entire petals, 3 stamens, a short 3-fid style, and 3-valved capsule.—Bay of Islands, Auckland, etc., introduced probably from Australia, where it is common, as it is in many other parts of the world.

*Cerastium*. A genus of very common, erect or straggling, hairy European weeds, having small, ovate, oblong, or lanceolate leaves and white flowers, 5 sepals, 5 notched or 2-fid petals, 10 stamens, 5 styles, and a tubular membranous capsule, opening at the top by 10 teeth; two species *C. viscosum*, Linn., and *C. glomeratum*, are abundant weeds of cultivation.

*Spergula arvensis*, Linn. An annual weed, with slender stems, bearing whorls of linear leaves and cymes of white flowers, 5 sepals petals and styles, 10 stamens and a 5-valved capsule.

## ORDER VII. PORTULACÆ.

Herbs, usually glabrous, often succulent, with opposite (rarely alternate) exstipulate (rarely stipulate) leaves and hermaphrodite flowers.—Sepals 2 or 3, imbricate. Petals 4 or 5, free or connate at the base, hypogynous, imbricated. Stamens 5 or fewer, often adnate to the base of the petals. Ovary 1-celled; style more or less deeply 2–3-fid, the arms stigmatose on the inner face; ovules several or many, in the base of the cell. Capsule membranous, with as many valves as styles, and one or many seeds. Seeds with a crustaceous testa, farinaceous albumen, and terete curved embryo.

A considerable Order, most abundant in America. The typical genus *Portulaca* (cultivated for salad) has a half-inferior ovary.

Leaves opposite or in pairs. Stamens 5, opposite the petals. Capsule 3- or many-seeded

Leaves opposite. Stamens 3–5, opposite the petals. Capsule 1–3-seeded

Leaves densely imbricate. Stamens 5, alternate with petals

1. CLAYTONIA.

2. MONTIA.

3. HECTORELLA.

### 1. CLAYTONIA, Linn.

Herbs with opposite alternate or fasciculate leaves, and racemose or solitary flowers.—Sepals 2, herbaceous. Petals 5, united at the very base, or free. Stamens 5, adnate to and opposite to the petals. Ovary many-ovuled. Capsule 3-valved, 3- or more seeded.

A large North American genus, of which the following is the only Old World or south hemisphere species, abounding in temperate Australia.

1. *C. australasica*, Hook. f.;—*Fl. N. Z.* i. 73. A glabrous, slender,

creeping, rather succulent, tender herb, extremely variable in size. Leaves solitary or in distant pairs, narrow-linear or linear-spathulate,  $\frac{1}{2}$ –2 in. long, quite entire, pale green, obtuse, nerveless, the petioles dilating into membranous stipules at the base. Scapes axillary, solitary, 1-flowered, erect, usually shorter than the leaves. Flowers pure white, very variable in size,  $\frac{1}{4}$ – $\frac{3}{8}$  in. diam.—Hook. Ic. Pl. t. 293.

**Middle Island:** boggy places, probably common; Milford Sound, *Lyall*; Otago, *Lindsay*; near Lake Tennyson, *Maling*; Southern Alps, *Haast*; Mount Alta, ascending to 5000 feet, *Hector and Buchanan*.

## 2. MONTIA, Linn.

A small, annual, branched or simple, usually tufted, glabrous herb, with opposite, rather fleshy, spathulate leaves, and small, white, axillary, peduncled flowers.—Sepals 2 (rarely 3). Petals 5, connate at the base. Stamens usually 3 or 5, opposite the petals and adnate to them. Ovary and capsule as in *Claytonia*, but only 1–3-seeded.

A British genus, found in many parts of the north and south temperate zone.

1. **M. fontana**, Linn. ;—*Fl. N. Z.* i. 74. A glabrous, slender, branching, weak, bright green marsh or water plant, very variable in size. Stems 1–12 in. high. Leaves  $\frac{1}{4}$ –1 in. long, from elliptical ovate to linear-lanceolate, sub-acute, quite entire. Flowers about  $\frac{1}{2}$  in. broad.

Common in watery places throughout the alpine parts of the **Northern** and the **Middle Islands**, and in **Campbell's Island**; also found in Tasmania, Kerguelen's Land, and throughout temperate Western North America and South America, etc.; Europe, Labrador, and Greenland, but not in eastern temperate North America, central Asia, nor in the Himalaya.

## 3. HECTORELLA, Hook. f., n. g.

A small, densely tufted, glabrous, moss-like plant. Leaves most densely imbricated all round the stem, coriaceous, entire. Flowers almost sessile amongst the uppermost leaves, white.—Sepals 2, short, concave, truncate, continuous with the very short, broad, flat pedicel. Petals 5, united at the very base, erect, veined, obtuse, thickened below the tip. Stamens 5, inserted on the tube of the corolla, alternate with its petals; filaments as long as the petals; anthers linear-oblong, 2-celled. Ovary ovoid, membranous, veined, narrowed into an erect style; stigmas 1–3, linear, thickened, papillose internally; ovules 4–5, erect from the base of the cell, amphitropous, funicle slender. Fruit unknown.

A remarkable genus, allied to no other, but approaching in habit *Lyallia* of Kerguelen's Land. Named in compliment to Dr. Hector, F.G.S., during whose adventurous expedition to the Otago alps it was discovered.

1. **H. cæspitosa**, Hook. f. Stems 1–1 $\frac{1}{2}$  in. high, most densely tufted, and with the leaves on them nearly as thick as the little finger. Leaves excessively numerous and closely imbricate, spreading, broadly triangular-ovate,  $\frac{1}{6}$  in. long, much dilated and membranous below the middle, coriaceous above with thickened margins and keel; veins reticulated. Flowers several from amongst the leaves at the tips of the stems, nearly  $\frac{1}{4}$  in. long, white.

**Middle Island:** Otago, Lake district, alt. 4–6000 feet, *Hector and Buchanan*.

## ORDER VIII. ELATINEÆ.

Small water-plants, rarely shrubs, mostly prostrate, with usually opposite stipulate leaves. Flowers small or minute, hermaphrodite, regular.—Sepals 2–5, free, imbricate. Petals 2–5, free, hypogynous, imbricate. Disk 0. Stamens as many as the petals or twice as many, hypogynous, free. Ovary free, 2–5-celled; styles 2–5, stigmas capitate; ovules numerous in the angles of the cells. Capsule septicidal, the valves falling away and leaving the seeds attached to a central column. Seeds straight or curved, with terete embryo and no albumen.

A small Order, scattered over various parts of the world, as is the only New Zealand genus.

## 1. ELATINE, Linn.

Aquatic, creeping, glabrous, small herbs, with pellucid-dotted leaves, and minute, axillary, solitary flowers.—Sepals membranous, obtuse. Ovary globose. Capsule membranous, the septa either disappearing or persistent on the axis. Seeds oblong or cylindrical, longitudinally striated and transversely wrinkled.

The species are found in ponds, lakes, etc., in various parts of the world, including Britain.

1. *E. americana*, Arnott;—*Fl. N. Z.* i. 27. A minute, glabrous, prostrate, matted aquatic. Stem rather succulent, creeping, sometimes elongated, and 1–8 in. long. Leaves small,  $\frac{1}{8}$ – $\frac{1}{2}$  in. long, obovate-oblong, obtuse, quite entire, shortly petioled. Flowers minute, sessile, 3-merous. Calyx persistent. Capsule with the septa disappearing. Seeds slightly curved.—*E. gratioloides*, A. Cunn.

**Northern** Island, probably common: bogs at Hokianga, *R. Cunningham*; also found in Tasmania and Australia, the Feejee Islands and North and South America.

## ORDER IX. HYPERICINEÆ.

Herbs shrubs or trees, with opposite, simple, quite entire or glandular-toothed, often pellucid-dotted, exstipulate leaves. Flowers regular, hermaphrodite.—Sepals 5, imbricate. Petals 5, hypogynous, imbricate. Disk 0. Stamens indefinite, hypogynous, free or polyadelphous, filaments filiform. Ovary 3–5-celled, or 1-celled with inflexed margins to the carpels; styles as many as carpels, filiform, free or connate, stigmas terminal; ovules numerous, in 2 series in the axis of the cells, or on the inflexed edges of the carpels. Fruit usually capsular. Seeds exalbuminous.

A large Order, widely distributed, as is the only New Zealand genus, which is also a British one.

## 1. HYPERICUM, Linn.

Sepals and petals 5. Stamens very numerous, all free or connected into bundles. Ovary 1- or 3–5-celled. Capsule septicidal. Seeds not winged, with a straight embryo.

Erect. Leaves subcordate, with revolute margins . . . . . 1. *H. gramineum*.  
Procumbent. Leaves oblong or obovate . . . . . 2. *H. Japonicum*.



1. **H. gramineum**, *Forst.*;—*Fl. N. Z.* i. 36. An erect or ascending, rather wiry, quite glabrous, perennial-rooted herb, branching from the root, with 4-angled branches, 6 to 12 in. high, slender and sparingly leafy. Leaves small,  $\frac{1}{2}$  to 1 in. long, sessile, cordate, oblong, obtuse, quite entire, black-dotted, margins usually revolute. Flowers subsolitary or in 3-ctomous terminal cymes,  $\frac{1}{4}$  to  $\frac{1}{2}$  in. across, on rather stout, erect, rigid peduncles. Sepals oblong or ovate, obtuse or acute, black-dotted, quite entire. Petals longer than the calyx, golden-yellow, curling inwards as they wither. Stamens nearly free. Capsule ovoid, acute, longer or shorter than the sepals.—*Labill. Fl. Austr. Caled.* t. 53.—*Brathys Forsteri*, Spach.

Common in grassy places throughout the islands, *Banks and Solander*, etc.; also frequent in temperate Australia, New Caledonia, and the hilly country of India.

2. **H. japonicum**, *Thunb.*;—*Fl. N. Z.* i. 37. A much smaller plant than *H. gramineum*, with prostrate branches, broader, flat leaves, smaller, often sessile flowers, having broader, more obtuse sepals, and shorter, rounder capsules; but apparently intermediate forms occur both in New Zealand, Australia, and India, in all which countries both occur, and I suspect they are the extreme forms of one variable species.—*H. pusillum*, *Choisy*; *A. Cunn. Prodr.*; *Ascyrum humifusum*, *Labill. Fl. Nov. Holl.* ii. t. 175.

Abundant in moist, grassy places, etc., throughout the islands, *Banks and Solander*, etc. Also found in many parts of temperate and subtropical Asia. A very similar and perhaps identical plant, inhabits the west coasts of temperate North and South America.

## ORDER X. MALVACEÆ.

Herbs shrubs or trees, with (usually) tough fibrous inner bark, alternate stipulate leaves, and stellate hairs. Flowers usually hermaphrodite, regular and large.—Calyx 5-lobed, lobes valvate. Petals 5, hypogynous, usually connate at the base, adnate to the staminal tube, imbricate. Disk 0 or a small torus. Stamens very numerous, their filaments united into a tube; anthers often reniform, 1-celled. Ovary of 1 or more free or connate 1- or many-ovuled carpels, whorled round and adnate with the torus; styles as many as carpels, connate below, filiform above. Fruit of one or more indehiscent or 2-valved cocci, or capsular. Seeds often hairy; albumen little or none; cotyledons large, folded.

A very large Order, abundant both in the tropics and temperate zones, to which the *Mal-low*, *Lavatera*, *Hollyhock*, *Cotton*, and many other well-known cultivated New Zealand garden plants belong.

Bracts 0 or small. Stigmas longitudinal. Ovules solitary . . . . . 1. **PLAGIANTHUS**.  
Bracts 0 or small. Stigmas capitate. Ovules solitary . . . . . 2. **HOHERIA**.  
Bracts large. Stigmas capitate. Ovules 2 to many . . . . . 3. **HIBISCUS**.

### 1. **PLAGIANTHUS**, *Forst.*

Shrubs or small trees, with very tough inner bark. Flowers uni- or bisexual.—Bracts 0, or small and distant from the calyx. Calyx 5-toothed or 5-fid. Staminal tube divided above into many short or long filaments. Ovary of 1 free, or many more or less united, 1-ovuled carpels; styles filiform or club-shaped, combined below, stigmatiferous towards the apex along the

inner face. Fruit of 1 indehiscient or irregularly bursting carpel, or of many whorled round an axis. Seed pendulous.

A genus confined to Australia and New Zealand.

Leaves small, linear. Peduncles 1-flowered. Carpels 1 or 2 . . . 1. *P. divaricatus*.  
 Leaves ovate, serrate. Panicles many-flowered. Carpel solitary . . . 2. *P. betulinus*.  
 Leaves ovate-cordate, serrate. Peduncles 1-flowered. Carpels many . . . 3. *P. Lyallii*.

1. ***P. divaricatus***, *Forst.*;—*Fl. N. Z.* i. 29. A rigid, glabrous, much-branched shrub, with slender spreading tough branches, small fascieled leaves, and minute white flowers, succeeded by small globose capsules. Leaves  $\frac{1}{3}$ – $\frac{3}{4}$  in. long, narrow-linear or subeuneate, obtuse, quite entire, 1-nerved. Flowers in axillary fascicles or 1-flowered peduncles, shorter than the leaves, minutely bracteolate near the base. Calyx hemispherical, glabrous. Petals concave, oblong, small. Staminal tube with 6–10 large sessile anthers. Capsules size of a peppercorn, globose, rarely didymous, oblique, downy, bursting irregularly.—*Hook. Bot. Mag.* t. 3271.

Abundant in salt marshes throughout the islands as far south as Akaroa, *Banks and Solander*, etc.

2. ***P. betulinus***, *A. Cunn.*;—*Fl. N. Z.* i. 29. A lofty tree, attaining 40–70 ft., when young a straggling bush with variable leaves. Leaves of young plants  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, ovate-rounded, variously crenate and lobed, in full-grown 1–2 in. long, ovate or ovate-lanceolate, acuminate, rounded or cuneate at the base, coarsely crenate-serrate, or obtusely doubly serrate, membranous, covered on both surfaces with small stellate hairs and reticulate venation; petiole slender. Panicles terminal, much branched, very many flowered, stellate-tomentose. Flowers small,  $\frac{1}{4}$  in. broad, white, on slender ebracteolate pedicels. Calyx campanulate. Petals linear-oblong, narrower in the male flowers. Staminal tube long, slender, exerted in the male, bearing many shortly-pedicelled anthers. Carpel 1. Capsule small, ovoid, acuminate, splitting down one side, 1-seeded.—*P. betulinus* and *urticinus*, *A. Cunn.*; *Philippodendron regium*, *Poit.* in *Ann. Sc. Nat.* ser. ii. 8. t. 3.

Abundant in forests throughout the islands, *Banks and Solander*, etc., as far south as Otago. "Ribbon-tree of Otago, wood worthless," *Buchanan*.

3. ***P. Lyallii***, *Hook. f.*—*Hoheria Lyallii*, *Fl. N. Z.* i. 31. t. 11. A small branching tree, 20–30 ft. high, with the young branches, inflorescence, and leaves below covered with white stellate down. Leaves 2–4 in. long, ovate-cordate, acuminate, deeply doubly crenate, glabrous above; petioles  $\frac{1}{2}$ – $1\frac{1}{2}$  in. Flowers large,  $\frac{3}{4}$  in. broad, white, axillary; peduncles 1-flowered, solitary or fascieled, ebracteolate, about as long as the petioles. Calyx broadly campanulate. Petals obliquely obovate-cuneate, obscurely notched on one side towards the apex. Staminal tube short, with many long filiform filaments. Ovary about 10-celled; style slender, divided into as many filiform branches, stigmatose on the inner surface towards the apex. Fruit a depressed sphere, breaking up into 10 compressed reniform membranous carpels. Seed much compressed.

In mountain districts throughout the **Middle** Island, from Nelson to Milford Sound; western districts of Otago, fringing the *Fagus* forest, *Hector and Buchanan*. Mr. Haast informs me that this forms a deciduous tree at and above 3000 ft., but is evergreen below

that level; in autumn its naked branches and yellow foliage give a peculiar colour to the landscape at the higher elevation.

## 2. HOHERIA, A. Cunn.

Small trees, with alternate, petioled, excessively variable, pellucid-dotted foliage, and fascicled, axillary, white, hermaphrodite flowers. Peduncles jointed in the middle. Bracts 0.—Calyx with a broad eup-shaped tube and 5 teeth. Petals linear-oblong, obtuse, oblique. Stamens 5-adelphous. Ovary 5-celled; styles 5, filiform, stigmas capitate. Carpels (unknown in *H. Sinclairii*) laterally quite flat, whorled round a central axis, from which they fall away when ripe, indehiscent, crested at the back with a membranous wing. Seed pendulous.

Leaves ovate-lanceolate or linear-oblong, sharply toothed . . . . . 1. *H. populnea*.  
Leaves broadly ovate, bluntly serrate . . . . . 2. *H. Sinclairii*.

1. **H. populnea**, A. Cunn.;—*Fl. N. Z.* i. 30. Tree 10–30 ft. high, branches hoary. Leaves glabrous, excessively variable in size, shape and toothing, 2–5 in. long, ovate or lanceolate, generally sharply or coarsely double-toothed or serrate. Flowers abundantly produced, snow-white, glabrous or hoary,  $\frac{1}{4}$ – $\frac{3}{4}$  in. diam. Carpels produced backwards and upwards into a wing.—Hook. Ic. Pl. t. 565, 566.

Var. *a. vulgaris*. Leaves ovate, with large sharp teeth.

Var. *β. lanceolata*. Leaves linear or oblong-lanceolate, toothed or serrate.

Var. *γ. angustifolia*. Leaves small, linear-oblong, spinulose-toothed. Flowers small.  
*H. angustifolia*, Raoul, Choix, 48. t. 26.

Var. *δ. cratægifolia*. Leaves ovate, variously lobed and toothed.

Abundant throughout the islands, *Banks* and *Solander*, etc. The bark affords a demulcent drink, and is also used for cordage, etc.

2. **H. Sinclairii**, Hook. f., *n. sp.* Larger in all its parts than *H. populnea*, and readily distinguished by its broadly ovate, acute, obtusely serrate, coriaceous, glabrous leaves. The peduncles are usually binate, and shorter than the petioles. It much resembles *Plagianthus Lyallii*, but the leaves are not cordate, more serrate, the peduncles jointed in the middle, stigmas capitate, and carpels 5.

**Northern** Island: near Auckland?, *Sinclair*. I find this fine species amongst some Auckland plants, sent without localities by Dr. Sinclair.

## 3. HIBISCUS, Linn.

Usually erect herbs, with often lobed leaves and handsome hermaphrodite flowers. Bracts numerous (or few) below the calyx, free or connate.—Calyx 5-fid or 5-toothed. Petals usually cuneate, oblique, soon withering. Staminal tube long, 5-toothed at the mouth, below which the filaments are inserted. Ovary 5-celled, with 5 spreading styles and terminal stigmas; cells 3- or many-ovuled. Capsule 5-valved, loculicidal. Seeds glabrous or woolly.

A very large tropical genus, containing many very handsome plants, some, as the *Ochra* (*H. esculentus*), yielding an esculent fruit, others (*H. cannabinus*), cordage; a few are trees, some climb.

1. **H. Trionum**, Linn.;—*Fl. N. Z.* i. 28. A hispid annual, often branched; stem almost woody below, erect or with spreading branches, 1–2 ft. high.

Leaves petioled, cordate, palmately 3-5-lobed, lobes linear, often serrate or sinuate, the middle one longest. Bracts numerous, setaceous. Flowers  $\frac{1}{2}$ -1 in. diam., yellow with a purple eye. Calyx membranous, hispid, veined. Stamens few or many. Seeds dark-brown, wrinkled, glabrous. Capsule hispid.—Bot. Mag. t. 209; *H. vesicarius*, Cav.; A. Cunn. Prodr.

Scattered over the islands, and possibly introduced (*A. Cunningham*). Most common in the northern parts of the **Northern** Island, and certainly indigenous (*Colenso*). **Middle** Island: South Wanganui, *Lyall*. A very common Australian, Asiatic, and S. African plant, also found in S. Europe and elsewhere in the Old World.

## ORDER XI. TILIACEÆ.

(Including ELÆOCARPEÆ.)

Trees or shrubs (rarely herbs) with often tough bark, alternate or opposite, often stipulate leaves. Flowers regular, hermaphrodite, rarely unisexual.—Sepals 4 or 5, free or connate, usually valvate. Petals 4 or 5, free, entire, lobed or cut. Torus generally conspicuous. Stamens usually numerous, free, inserted on the torus; filaments filiform; anthers 2-celled, often opening by terminal pores. Ovary sessile on the torus, 2-10-celled; style simple, usually divided at the apex into as many divisions as cells; ovules few or many, attached to the axis of the cells. Fruit very variable. Seeds generally with fleshy albumen, and broad, flat, thin cotyledons.

A very large tropical and subtropical Order of plants, to which the English Lime-tree (*Tilia*) belongs, together with the Indian Jute (*Corchorus*), valued for its fibre.

Leaves alternate. Petals entire. Capsule echinate . . . . .	1. ENTELEA.
Leaves opposite. Petals erenate or lacerate. Berry 2-4-celled . . . . .	2. ARISTOTFLIA.
Leaves alternate. Petals lacerate. Drupe 1-celled . . . . .	3. ELÆOCARPUS.

### 1. ENTELEA, Br.

A small branching light-wooded tree, covered with stellate down, having large, alternate, 5-7-nerved, cordate, toothed stipulate leaves, and umbellate cymes of white flowers.—Sepals 4 or 5, free. Petals 4 or 5, undulate. Stamens very numerous, free, on a low torus, with filiform filaments and versatile anthers. Ovary 4-6-celled; style simple, stigmatiferous at the toothed apex; cells many-ovuled. Capsule globose, echinate with long rigid bristles, 4-6-valved, loculicidal.

1. **E. arborescens**, Br.;—*Fl. N. Z.* i. 33. Leaves 4-8 in. long, on long petioles, oblique, often lobed irregularly and acutely, doubly or trebly crenate or serrate; stipules persistent. Flowers white, abundant, in erect cymes, bracteate at the axils,  $\frac{3}{4}$ -1 in. diam., drooping. Sepals acuminate. Ovary hispid. Capsule the size of a hazel-nut, spines nearly 1 in. long. Seeds in two rows, albumen oily.—Bot. Mag. t. 2480; *Apeiba australis*, A. Rich. Flor. t. 34.

Not rare throughout the **Northern** Island, *Banks and Solander*, etc. The genus is confined to New Zealand.



2. **ARISTOTELIA**, L'Héritier.

Shrubs or trees, with opposite or subopposite, exstipulate leaves. Flowers usually unisexual.—Sepals 4 or 5, valvate or subimbricate. Petals 4 or 5, lobed or crenate, rarely entire, sometimes minute. Stamens 4 or 5 or numerous, inserted on the glandular torus; filaments short; anthers with short terminal slits. Ovary 2-4-celled; style subulate, entire; cells 2-ovuled. Berry 2-4-celled, few- or many-seeded. Seeds often fleshy on the outside of the hard testa.

A small genus, with two Australian and Tasmanian, one Chilian, and the three following New Zealand species.

Leaves large, membranous, pubescent. Racemes many-flowered . . . 1. *A. racemosa*.  
 Leaves large, membranous, glabrous. Racemes many-flowered . . . 2. *A. Colensoi*.  
 Leaves small, coriaceous. Flowers few . . . 3. *A. fruticosa*.

1. ***A. racemosa***, Hook. f. *Fl. N. Z.* i. 33. A small handsome tree, 6-20 ft. high, with blackish bark and pubescent twigs. Leaves on long petioles, membranous, pubescent, variable in form, 3-5 in. long, ovate cordate or oblong-lanceolate, acuminate, deeply irregularly and acutely serrate, often red or purple beneath. Racemes paniced, axillary, many-flowered, peduncles and pedicels slender. Flowers dicæcious, small, the males largest,  $\frac{1}{6}$ - $\frac{1}{8}$  in. diam., nodding. Petals 4, 3-lobed, rosy, of the female flower very small. Stamens numerous, yellow, minutely hairy; anthers longer than the filaments. Ovary usually 4-celled. Berry size of a pea, eaten by the natives.—*Friesia racemosa*, A. Cunn. Prodr.; Hook. Ic. Pl. t. 601.

Abundant throughout the islands, *Banks and Solander*, etc. "Wood white, very light, makes veneers," *Buchanan*.

2. ***A. Colensoi***, Hook. f., *n. sp.* Very similar in most respects to *A. racemosa*, but differing in the much narrower, perfectly glabrous leaves, which are ovate-lanceolate, narrowed into a long acuminate point, deeply irregularly serrate; and the small fruit, which is no bigger than a peppercorn. The seeds are as in *A. racemosa*. I have seen no flowers.

**Northern Island**: woods in the Wairarapa valley, *Colenso*.

3. ***A. fruticosa***, Hook. f. *Fl. N. Z.* i. 34. A small, rigid, erect or decumbent shrub, with woody tortuous branches, and erect or spreading downy shoots, with red-brown bark. Leaves very variable, on short, downy or glabrous petioles, coriaceous,  $\frac{1}{4}$ -1 in. long, ovate obovate or linear-oblong, obtuse, entire crenate toothed serrate or lobed. Flowers minute, usually solitary and axillary, rarely racemose; peduncles usually short. Petals 4, very short or as long as the calyx, entire or lobed, pink, shorter in the female. Stamens 4-6; filaments short; anthers downy. Ovary 2-4-celled. Berry globose, small, 4-6-seeded. Seed with a bony, rugged testa, covered with a thin pulp.

Common in mountain districts, alt. 2-4000 ft., throughout the islands, and varying greatly, *Colenso*, etc. I have made four varieties in the New Zealand flora, but they seem to be states determined by age and exposure, rather than hereditary races; of these the var.  $\beta$  is possibly a very small form of *A. racemosa*.

3. **ELÆOCARPUS**, Linn.

Trees, generally hard-wooded, with the branches leafy at the extremity.

Leaves generally alternate, exstipulate.—Flowers racemose, usually hermaphrodite, pendulous. Sepals 4 or 5, valvate. Petals 4 or 5, laciniate, induplicate-valvate. Stamens numerous, seated on a glandular torus; filaments short, anthers long, awned, pubescent, opening by a short, terminal slit. Ovary 2-5-celled; style subulate, stigma simple; ovules 2 or more, pendulous. Drupe with one bony, 1- or several-celled nut, which is often tubercled or wrinkled. Seed pendulous.

A very large tropical Asiatic, Australian, and Polynesian genus.

Twigs silky. Leaves with recurved margins . . . . . 1. *E. dentatus*.

Twigs glabrous. Leaves flat . . . . . 2. *E. Hookerianus*.

1. ***E. dentatus***, *Vahl*;—*E. Hinau*, A. Cunn.; Fl. N. Z. i. 32. A small tree, with brown bark, which yields a permanent dye; branches fastigiate at the top of the naked trunk, silky when young. Leaves erect, petioled, 2-3 in. long, very coriaceous and variable, linear-oblong obovate or lanceolate, obtuse or acuminate, margins recurved, sinuate-serrate, below often white with silky down, and with hollows where the veins meet the midrib. Racemes glabrous or silky, of many white pendulous flowers  $\frac{1}{3}$  in. diam. Petals lobed or lacerate. Anthers with a flat recurved tip. Drupe  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, ovoid, pulp astringent but eatable; stone deeply furrowed.—Hook. Ic. Pl. t. 602; *E. Cunninghamii*, Raoul, Choix, 25; *Dicera dentata*, Forst.; *Eriostemon dentatum*, Colla, Hort. Rip. lii. t. 30.

Common throughout the islands, *Banks and Solander*, etc.

2. ***E. Hookerianus***, *Raoul, Choix*, t. xxv.;—*Fl. N. Z.* i. 32. A small, quite glabrous tree, 30-40 ft. high, like *E. dentatus* in habit, but smaller in all its parts. Leaves coriaceous, elliptical or linear-oblong, obtuse,  $1\frac{1}{2}$ –2 in. long, margins flat, crenate or sinuate-serrate, those of young plants linear and pinnatifid; petioles  $\frac{1}{4}$ – $\frac{1}{2}$  in. long. Racemes erect, shorter than the leaves, with small, drooping, whitish flowers. Sepals lanceolate. Petals rather longer, unequally cleft into obtuse lobes. Anthers obtuser than in *E. dentatus*. Drupe small, blue,  $\frac{1}{3}$  in., with a furrowed rugose nut.

Willy and other parts of the **Northern** Island; and common on the **Middle** Island, *Cotenso, Raoul*, etc.

## ORDER XII. LINEÆ.

Herbs or undershrubs, usually with entire, alternate leaves, and subracemose, handsome, hermaphrodite, regular flowers.—Sepals 5, free, imbricate. Petals 5, free, fugacious, contorted. Stamens 5, hypogynous; filaments united below into a cup, which has usually 5 minute glands at its base; anthers versatile. Ovary 3-5-celled; styles 3-5, stigmas terminal; cells 1-2-ovuled. Capsule splitting septicidally into indehiscent or dehiscent 1-2-seeded cocci. Seeds with scanty albumen or 0.

A rather large Order, in temperate and tropical countries, of which the tribe *Eulinea* is chiefly temperate. The Flax, *L. usitatissimum*, belongs to the only N. Z. genus, which is a large European one.

### 1. LINUM, Linn.

Glabrous herbs, with narrow, quite entire leaves, fibrous bark, and usually

large flowers.—Sepals 5, entire. Stamens alternating with 5 setiform processes of the staminal tube. Ovary 5-celled; cells imperfectly divided by a longitudinal septum. Cocci 5, septate, 2-seeded, or 10, by each splitting along the septum.

1. **L. monogynum**, *Forst.*;—*Fl. N. Z.* i. 28. A perennial, variable herb, sometimes woody at the base, simple or branched, 6–12 in. high, erect or decumbent. Leaves  $\frac{1}{4}$ –1 in. long, oblong linear or linear-subulate, 1–3-nerved. Flowers numerous, white or pale-blue, very variable in size. Sepals ovate-lanceolate, acute. Styles united, their free tips recurved. Capsule globose, of 10 cocci.—*Bot. Mag.* t. 3574.

Var. *a. grandiflorum*. Erect, branched; flowers numerous  $\frac{1}{2}$  to 1 in.

Var. *b. diffusum*. Decumbent; flowers few,  $\frac{1}{4}$  to  $\frac{1}{2}$  in.

Common, especially on rocky coasts throughout the islands, *Banks and Solander*, etc. ascends 2000 ft. in the mountains of Canterbury, *Haast*. Chatham Island, var. *a*, *Dieffenbach*.

## ORDER XIII. GERANIACEÆ.

(Including OXALIDÆÆ.)

Herbs (the New Zealand species), with alternate, stipulate or exstipulate leaves, and regular or irregular hermaphrodite flowers.—Sepals 5, free, imbricate, one sometimes spurred. Petals 5, rarely fewer, imbricated. Disk inconspicuous or glandular. Stamens 10, hypogynous, the alternate ones often smaller, or imperfect, or without anthers; filaments often connate below; anthers versatile. Ovary 3–5-lobed, or of 3–5 carpels combined in the axis, produced into as many free or connate styles, with capitate or longitudinal stigmas; cells 1- or more ovuled. Fruit capsular, 3–5-lobed, 3–5-valved, variously dehiscing. Seeds with little or no albumen.

A very large Order, containing many genera absent in New Zealand, differing a good deal in structure, to some of which the above character does not altogether apply.

Flowers regular. Styles combined. Carpels caudate . . . . . 1. GERANIUM.

Flowers irregular. Calyx with a spur adnate to the pedicel . . . . . 2. PELARGONIUM.

Flowers regular. Styles free. Leaves 3-foliolate . . . . . 3. OXALIS.

### 1. GERANIUM, Linn.

Stemless or branching herbs, with stipulate leaves, and axillary, 1–2-flowered, 2-bracteolate peduncles.—Flowers regular. Torus with 5 glands alternating with the petals. Stamens 10, all perfect (rarely 5 imperfect), free or united at the base. Ovary 5-celled, beaked; beak terminated by 5 short styles, which are longitudinally stigmatose; cells 2-ovuled. Capsule of 5, tailed, 1-seeded cocci, elastically curling up and separating from the axis, to which their tails remain attached. Cotyledons plicate or convolute.

A large genus in Britain, and all temperate regions of the world. The roots are astringent. All the New Zealand species are biennial- or perennial-rooted. The species are most puzzling to discriminate.

Peduncles 2-flowered. Sepals awned. Carpels hairy. Seeds pitted 1. *G. dissectum*.

Peduncles 1-flowered. Sepals hardly awned. Carpels hairy. Seeds scarcely dotted . . . . . 2. *G. microphyllum*.

- Peduncles 2-flowered. Sepals awned. Carpels hairy. Seeds quite even. (Stemless.) . . . . . 3. *G. sessiliflorum*.  
 Peduncles 2-flowered. Sepals not awned. Carpels glabrous. Seeds smooth . . . . . 4. *G. molle*.

1. ***G. dissectum***, Linn., var. ***carolinianum***, Fl. N. Z. i. 39. Stem 1–2 ft. high, stout, erect or decumbent, branched, more or less covered with spreading, usually retrorse hairs. Leaves 1–2 in. diam., on long petioles, orbicular, deeply cut into few or many, broad or narrow, obtuse or acute lobes; stipules broad, scarious. Peduncles slender, 2-flowered, with ovate, subulate bracts. Flowers very variable in size,  $\frac{1}{4}$ – $\frac{3}{4}$  in. diam. Sepals hairy, awned. Petals notched or retuse, pink. Carpels and their beaks hairy, even. Seeds deeply and coarsely pitted.

Var. *a. pilosum*. Covered with spreading hairs. Petals often rather large.—*G. pilosum*, Forst.; *G. patagonicum*, Hook. f., Fl. Antarct. ii. 252.

Var. *β. patulum*. Leaves covered with spreading and retrorse hairs. Petals usually small.—*G. retrorsum*, DC. Prodr.; *G. patulum*, Forst. Prodr.

Var. *γ. glabratum*. More glabrous, the leaves 3–5-lobed, with the lobes broader.

Abundant throughout the islands, *Banks* and *Solander*, etc. A most puzzling plant, occurring in S. America from Canada to Cape Horn. It is described in the N. American Floras as annual or biennial; the roots seem annual in Canadian and United States specimens, but perennial in West N. America, Rocky Mountain, and Chilian ones; the petals also, which are as short as the sepals in the United States form, become larger in the West American. The New Zealand form differs from the European *G. dissectum*, chiefly in the petals being often large, always less deeply notched, and the root always more than annual; but I do not find these distinctions to be constant. The amount and depth of pitting of the seed varies much in different specimens. The species ranges through temperate Australia, and North and South America, in which latter country it has several names.

2. ***G. microphyllum***, Hook. f. Fl. Antarct. i. 8. t. v.—*G. potentilloides*, L'Héritier; Fl. N. Z. i. 40. A very slender, prostrate, straggling, branched plant, 12–15 in. long, more or less covered with silky white, appressed or spreading hairs, often retrorse on the peduncles and pedicels. Leaves orbicular,  $\frac{3}{4}$ –1 in. broad, usually cut to or below the middle into 5–7 broad, obtuse, toothed, lobes; petioles slender; stipules small. Peduncles rarely 2-flowered. Flowers smaller than in *G. dissectum* *β*, excepting in fine specimens, the sepals with very short awns, and the petals larger in proportion, white or pale-pink, retuse. Carpels even, with short hairs. Seeds minutely dotted.

Mountainous or hilly situations in all the islands, *Banks* and *Solander*, etc. **Lord Auckland's** group, *J. D. H.* In the N. Z. Flora I referred this to the Tasmanian *G. potentilloides*, which is however referred by Bentham, Mueller, and Archer to *G. pilosum*, Forst. (*dissectum*, Linn.), from which this differs in the much more slender habit, smaller less-lobed leaves, smaller less-pointed sepals, and very obscurely pitted seeds. The varieties *debile* and *microphyllum* of Fl. N. Z. are only forms, connected by too many intermediates to be retained as varieties.

3. ***G. sessiliflorum***, Cav.;—*G. brevicaule*, Hook.; Fl. N. Z. i. 40. Stemless, or nearly so; root stout; branches, if present, very short, and leaves more or less covered with silky hairs, which are spreading or retrorse on the petioles, pedicels, and sepals. Leaves mostly radical, very numerous, on long, slender petioles, 3–6 in. long, orbicular, cut to or below the middle into cuneate 5–7-fid lobes; stipules broad, membranous. Peduncles short, from the root, or from branches which are rarely longer than the leaves. Flowers between those of *G. dissectum* *β*, and *microphyllum*. Sepals awned, very hairy.



Petals retuse, longer than the sepals. Carpels even, pilose. Seeds quite even or minutely punctulate, not pitted.—Fl. Antaret. ii. 252.

Mountain regions in the **Middle** Island. Terraces on the Kowai river, *Sinclair and Haast*; Chalky Bay, *Lyall*; Otago, *Hector and Buchanan*. Also found in Tasmania, on the Australian alps, in Fuegia, and South Chili; it scarcely differs from *G. dissectum* α, except in habit and the even seeds. Colenso's Ruahine mountain specimens are, I think, referable to *G. microphyllum*.

4. **G. molle**, *Linn.*;—*Fl. N. Z.* i. 40. A procumbent, much-branched, slender plant, covered everywhere with soft spreading hairs. Leaves 1 in. broad, orbicular or reniform, more or less 5-9-lobed, the segments 3-5-fid; petioles long; stipules very broad and membranous. Peduncles 2-flowered, with broad membranous bracts. Flowers  $\frac{1}{4}$ – $\frac{1}{3}$  in. broad. Sepals broadly ovate, not awned. Petals bifid, longer than the sepals, pink. Carpels wrinkled, quite glabrous. Seeds even, not dotted.

Var. β? Carpels not at all wrinkled.

**Northern** and **Middle** Islands, *Lyall* (without habitat); β, Hawke's Bay, *Colenso*. I am much puzzled with this plant, which is not a native of any part of Australia or of America, though common in Europe, and extending east to the Himalaya. *Lyall's* specimens are identical with the European, and quite characteristic of the commonest state of *G. molle* in every particular; but all *Colenso's* have quite even carpels, as in the European *G. pusillum*, *Linn.*, and *G. rotundifolium*, *Linn.*, from both of which they differ in their glabrous carpels, and from the latter also in the bifid petals.

## 2. PELARGONIUM, L'Héritier.

Herbs (rarely shrubs), with opposite, simple lobed or dissected, stipulate leaves, and 1- or many-flowered axillary peduncles.—Flowers slightly irregular. Sepals 5, the upper produced into a spur which is adnate with the pedicel. Petals 5 or fewer, the upper often dissimilar. Torus with 5 glands. Stamens 10, of which 7 only or fewer are antheriferous. Ovary and fruit as in *Geranium*.

A very large South African genus, rare elsewhere, and almost absent in Europe, Asia, and America; a few are Australian.

1. **P. australe**, *Willd.*, var. **clandestinum**;—*P. clandestinum*, L'Hér.; *Fl. N. Z.* i. 41. A more or less hairy, perennial herb; stem erect, simple or branched, 4 in.–2 feet high. Leaves orbicular or ovate, deeply cordate at the base, 3-5-lobed, lobes coarsely or finely toothed or serrate; petioles slender, 2-6 in. long. Peduncles axillary, longer than the leaves, pubescent, many-flowered. Flowers small,  $\frac{1}{2}$  in. broad, in 10-12-flowered umbels, with whorled, ovate, acuminate bracts at the base; pedicels  $\frac{1}{6}$ – $\frac{1}{2}$  in. long, pubescent with scattered white hairs. Sepals unequal, ovate, acuminate; spur short, gibbous, or 0. Petals unequal,  $\frac{1}{12}$ – $\frac{1}{6}$  in. long, deep pink, longer than the sepals, spatulate, notched. Stamens about 5 fertile, the rest reduced to membranous scales. Carpels very hairy, their tails lined on the inner face with white silky hairs. Seeds minutely dotted.—*P. acugnaticum*, Thouars; *P. grossularioides*, Aiton; Harv. and Sond. *Flor. Cap.* i. 289.

**Northern** and **Middle** Islands: abundant, especially near the sea, *Banks and Sotander*, etc. A lotion of bruised leaves of this is applied by the natives to scalds and burns. Also found in Tristan d'Acunha, South Africa and Australia.

3. **OXALIS**, Linn.

Stemless or branching, usually slender, perennial, acid herbs, with alternate or tufted, usually stipulate, 3-foliate or pinnate leaves, and obcordate leaflets.—Flowers regular. Sepals 5, imbricate. Petals 5, contorted. Disk and glands 0. Stamens 10, all fertile. Ovary 5-lobed, 5-celled; styles 5; cells 1- or more ovuled. Capsule loculicidal; valves more or less cohering together and by the septa to the axis. Seeds with an arilliform, fleshy coat, that bursts elastically; albumen fleshy.

A very large genus, abounding in South Africa, of which a few species are British, and very widely diffused in both tropical and temperate countries. The foliage affords a grateful acid. Stems elongate, branching. Stipules 0 or small. Flowers yellow . . . 1. *O. corniculata*. Stems short or 0. Stipules large. Flowers white . . . . . 2. *O. magellanica*.

1. ***O. corniculata***, Linn.;—*Fl. N. Z.* i. 43. An erect or decumbent, branched, slender, glabrous or pubescent herb, usually with a perennial root; branches 1–10 in. long, erect, ascending, or more usually prostrate, sometimes matted together. Leaves 3-foliate; leaflets deeply obcordate,  $\frac{1}{3}$ –1 in. long, glaucous below; stipules small or 0; petioles slender, very variable. Peduncles axillary, 1–6-flowered, variable in length. Flowers most variable in size. Petals yellow, notched. Capsules oblong or linear.

Var. *a.* Decumbent. Leaves stipulate.

Var. *B. stricta*. Erect or suberect. Leaves exstipulate.—*O. stricta*, Linn.; *O. Urvillei*, *lacicola*, *propinqua*, and *divergens*, A. Cunn. Prodr.; *O. ambigua*, A. Rich. Flor.

Var. *γ. microphylla*. Stems procumbent. Branches creeping. Leaflets very minute. Capsule oblong.—*O. microphylla* and *O. exilis*, A. Cunn. Prodr.

Var. *δ. ciliifera*. Stems procumbent, filiform. Leaflets membranous, ciliated.—*O. ciliifera* and *tenuicaulis*, A. Cunn. Prodr.

Var. *ε. crassifolia*. Stems rigid, matted together. Leaflets small, thick, pilose.—*O. crassifolia*, A. Cunn. Prodr.

Abundant, especially on the east coasts, throughout the islands, *Banks and Solander*, etc. One of the commonest and most variable weeds of warm climates.

2. ***O. magellanica***, Forst.;—*Fl. N. Z.* i. 43. t. 13. A small, glabrous, or pubescent, stemless, rather succulent species, 3–4 in. high. Rhizome creeping, perennial, covered with imbricate scales (old stipules). Leaves 3-foliate; leaflets broadly obcordate, glabrous, glaucous below. Petioles usually hairy. Peduncles radical, 1-flowered, 2-bracteolate, often longer than the leaves. Sepals ovate, obtuse. Petals pure white,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, oblong-ovate or obcordate, often oblique and ciliated. Capsules globose.—*O. Cataractæ*, A. Cunn. Prodr.; Hook. Ic. Pl. t. 418.

Throughout the islands, in damp, shady, alpine, and subalpine regions. Common in similar situations in Tasmania, Fuegia, and S. Chili, very nearly allied to the European Wood Sorrel (*O. Acetosella*, Linn.).

*Erodium cicutarium*, Linn., a common European hairy pinnate-leaved geranium-like plant, seems now to be naturalized throughout the islands (as in Australia); it has regular flowers, 5 anthers, and the tails of the carpels bearded inside.

ORDER XIV. **RUTACEÆ.**

Shrubs and trees. Leaves opposite or alternate, exstipulate, pellucid-dotted, usually fragrant, simple or compound. Flowers regular, hermaphro-

dite.—Sepals and petals 4 or 5, spreading, imbricate or valvate. Stamens usually 8 or 10, free, inserted at the base of a tumid disk; anthers versatile. Ovary of 4 or 5, more or less united carpels; styles 4 or 5, wholly combined, or by a capitate stigma only; cells 2-ovuled. Fruit capsular, of 4 or 5 coriaceous, 2-valved, 1-seeded cocci; outer coat separating from the inner, which is chartaceous, dry, and elastic. Seeds oblong, testa crustaceous; albumen copious or 0.

A very large Natural Order, now including the Rue, Orange, Cape Diosmas, Australian Boronias, and many other plants differing in certain points from the above ordinal character, abounding in the temperate regions of the southern hemispheres, especially in South Africa and Australia, rarer elsewhere.

Flowers pentamerous. Leaves simple . . . . . 1. PHEBALIUM  
Flowers tetramerous. Leaves compound . . . . . 2. MELICOPE.

### 1. PHEBALIUM, Ventenat.

Shrubs. Leaves alternate, pellucid-dotted. Flowers in axillary or terminal corymbs, white.—Calyx small, 4 or 5-lobed or -parted. Petals 4 or 5, imbricate or valvate. Stamens 8 or 10; filaments filiform, glabrous. Ovary 2-5-parted, almost to the base; style simple, rising from between the lobes, stigma capitate; cells 2-ovuled. Cocci 2-5, truncate or rostrate; endocarp separating. Testa smooth, black, shining.

A very large Australian genus, not found elsewhere.

1. **P. nudum**, *Hook. Ic. Pl. t. 568*;—*Fl. N. Z. i. 44*. A shrub or small tree, 12-15 ft. high, everywhere glabrous; branches very slender. Leaves alternate, 1-1½ in. long, spreading, linear-oblong or narrow oblong-lanceolate, obtuse, obscurely crenate, narrowed below into very short petioles, coriaceous, paler and dotted below. Flowers in terminal many-flowered corymbs, whitish, ¼-⅓ in. diam., on pedicels ⅙-¼ in. long. Calyx very small, 5-lobed. Petals 5, linear, obtuse, with narrowly overlapping margins. Cocci ½ in. long, obtusely rhomboidal, compressed, wrinkled, often only one ripens, splitting down the front and back into 2 valves.

**Northern Island**: Bay of Islands, *A. Cunningham*; east coast, *Edgerley, Colenso*; Auckland, *Sinclair*. Exceedingly closely allied to the Queensland *P. elatius*, *F. Muell.*, but the flowers are larger, the petals longer, the corymbs more flattened, and the leaves taper less to the base; they may prove to be local forms of one species.

### 2. MELICOPE, Forst.

Glabrous shrubs. Leaves opposite or alternate, simple or compound, pellucid-dotted. Flowers in axillary many- or few-flowered cymes, more or less unisexual.—Sepals 4, deciduous or persistent. Petals 4, sessile, spreading, valvate or imbricate, with inflexed tips. Stamens 8; filaments subulate. Ovary 4-lobed, 4-celled; style 1, or 4 coalescing into 1, from between the lobes, stigma capitate; cells 2-ovuled. Cocci 1-4, spreading, free; endocarp separating. Testa shining; albumen abundant; embryo slightly curved.

A Pacific Island genus, very variable in habit, which does not extend westward into Australia. The two New Zealand species are extremely dissimilar in habit.

Leaves opposite, 3-foliolate . . . . . 1. *M. ternata*.  
Leaves alternate or fascicled, 1-foliolate . . . . . 2. *M. simplex*.

1. **M. ternata**, *Forst.*;—*Fl. N. Z.* i. 43. A glabrous, small tree, 12–15 ft. high; branches rather stout. Leaves opposite, 3-foliolate; leaflets 3–4 in. long, ovate or linear-oblong, acute, quite entire, longer than the petioles. Flowers  $\frac{1}{3}$  in. diam., greenish-white, in peduncled, trichotomous, axillary cymes; bracts deciduous. Petals ovate, longer than the stamens, margins imbricate. Ovary quite glabrous; style short. Carpels 4, spreading, coriaceous, strongly wrinkled; seed small, black, projecting from the fissure, attached by a slender funicle.—Hook. Ic. Pl. t. 603.

**Northern** and **Middle** Islands, *Banks and Solander*, etc.: not uncommon as far south as the Nelson Province.

2. **M. simplex**, *A. Cunn.*;—*Fl. N. Z.* i. 43. A glabrous shrub, 6–8 ft. high; branches slender. Leaves alternate, scattered or fascicled, small, of 1 (very rarely 3, of which the lateral are minute), orbicular obovate or ovate, obtuse, doubly crenate leaflet,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, jointed on the top of a flattened almost winged petiole,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, which is broader towards the leaflet and channelled above. Pedicels several together, axillary, slender, longer than the petioles, 1–4-flowered, bracteolate at the forks. Flowers very small, greenish-white. Petals linear-oblong, shorter in the male flowers than the stamens, valvate, or with the edges a little overlapping. Ovary oblong, hirsute; style in the female flowers slender; stigma capitate. Fruit as in *M. ternata*, but much smaller.—Hook. Ic. Pl. t. 585.

**Northern** and **Middle** Islands, *Banks and Solander*, etc.: not uncommon along the whole coasts to Otago. A very different-looking plant from *M. ternata*.

## ORDER XV. MELIACEÆ.

Trees (rarely shrubs). Leaves usually pinnate, alternate, exstipulate. Flowers regular, generally hermaphrodite.—Calyx small, 4 or 5-lobed or -parted, imbricate. Petals 4 or 5, contorted valvate or imbricate, often long, sometimes united to the staminal tube. Disk free or wanting, sometimes tubular within the stamens. Stamens usually 8 or 10, more or less united into a tube, bearing the sessile anthers within its mouth, which is often toothed or split. Ovary free, 3–5-celled; style single, terminal, stigma capitate; cells 2-ovuled. Fruit a drupe berry or capsule, usually the latter, coriaceous, 3-celled, loculicidally 3-valved. Seeds generally solitary in the cells, mostly arillate and exalbuminous.

A very large Order of tropical forest-trees, of which various genera present characters of the flower and fruit at variance with the above description. The Mahogany (*Swietenia*), Satin-wood (*Chloroxylon*), and Pride-of-India (*Melia*), all belong to it.

### 1. DYSOXYLUM, Blume.

Large forest-trees, often fetid or with a garlicky smell. Leaves alternate, pinnate. Flowers rather small, in axillary panicles.—Calyx short, 4 or 5-lobed -toothed or -parted, imbricate. Petals 4 or 5, linear-oblong, valvate, sometimes united at the base and with the staminal tube, which is cylindric, 8 or 10-toothed; anthers 8 or 10, included. Disk tubular, sheathing the 3–5-celled ovary. Capsule coriaceous, globose or pyriform, 1–5-celled, 2–5-valved,



splitting down the middle of the cells; valves with the septa on their faces. Seeds large, arillate or naked, oblong; hilum broad, ventral; testa brown, shining; cotyledons very large; plumule included or exserted.

A large tropical Asiatic, Australian, and Pacific Island genus of timber and forest trees.

1. **D. spectabile**, *Hook. f.*;—*Hartighsia spectabilis*, A. Juss.;—*Fl. N. Z.* i. 39. A large tree, 40–50 ft. high. Leaves 1 ft. or more long, pinnate; leaflets about 4 pairs, alternate, petioled, oblong-obovate, acute, 3–6 in. long, quite glabrous, entire, oblique at the base, narrowed into the terete petiole. Panicles 8–12 in. long, usually growing from the trunk, sparingly branched, ebracteate. Flowers shortly pedicelled,  $\frac{1}{2}$  in. broad. Calyx lobes very small, ciliate. Petals linear, patent, obtuse. Staminal tube cylindric, fleshy, crenate; anthers quite included, sessile on thickened prominences. Style very slender; stigma disciform. Capsule obovate, pendulous, 1 in. long. Aril scarlet.—*Hook. Ic. Pl. t.* 616 and 617.

**Northern** Island: Bay of Islands, *A. Cunningham*, etc.; east coast, *Banks and Solander*. **Middle** Island, *Forster*. Mr. Bidwill observes that the leaves are bitter, and used for hops, and to make a stomachic infusion.

## ORDER XVI. OLACINÆÆ.

Shrubs or trees. Leaves simple, alternate, rarely opposite, exstipulate. Flowers regular, axillary or terminal, hermaphrodite or unisexual.—Calyx small, 4 or 5-toothed -lobed or -parted. Petals 4 or 5, free or coalescing into a tube, valvate. Stamens 4 or 5, hypogynous (or at the base of a disk). Ovary free, 1- or imperfectly 3–5-celled; style long or short, stigma often lobed; ovules 1–3 collaterally pendulous from below the top of the cell, or from the top of a central erect free placenta. Fruit usually a 1-celled, 1-seeded, dry or fleshy drupe. Seed pendulous, testa very thin; albumen copious, fleshy; embryo minute, terete.

A large tropical Order, containing many genera of very various characters not included in the above description, often extremely difficult of determination, on account of their minute flowers, and almost microscopic ovaries and ovules. The only New Zealand genus is also a native of Norfolk Island.

### 1. **PENNANTIA**, *Forst.*

Trees. Leaves alternate, entire or toothed. Cymes many-flowered. Flowers polygamous.—Calyx minute, 5-toothed. Petals 5, valvate. Stamens 5, hypogynous; filaments filiform, free, flattened at the base; anthers versatile. Ovary oblong, obscurely trigonous, 1-celled; stigma almost sessile, discoid, 3-lobed; ovule 1, pendulous below the top of the cell. Drupe small, fleshy; stone crustaceous, obtusely 3-gonous, grooved on one face, and perforated on that face below the apex; a flattened cord passes up the groove, enters the cell by the foramen, and bears the pendulous seed at its tip.

1. **P. corymbosa**, *Forst.*;—*Fl. N. Z.* i. 35. *t.* 12. A small, very graceful tree, covered with white sweet-smelling flowers, 20–30 ft. high; bark whitish; wood brittle; twigs and young cymes pubescent. Leaves on short petioles, 1–3 in. long, ovate obovate or oblong, obtuse, sinuate or toothed,

rarely entire, often turning black in drying. Male flowers largest, filaments longer than the petals; ovary reduced to a papilla; pedicels jointed below the calyx. Berries ovoid, black, fleshy, with purple juice,  $\frac{1}{3}$  in. long.

**Northern** Island: chiefly in mountain woods; more abundant throughout the **Middle** Island, *Banks and Solander*, etc. Wood used by the natives for kindling fires by friction. Development of the fruit very curious, and well worth an attentive study. The only other species (*P. Endlicheri*) is a native of Norfolk Island.

## ORDER XVII. STACKHOUSIÆÆ.

Herbs, perennial-rooted. Leaves narrow, alternate, almost exstipulate. Flowers in terminal spikes or racemes, greenish white or yellow, hermaphrodite, regular.—Calyx with a small hemispherical tube, and 5 small imbricate lobes. Petals 5, inserted at the edge of a disk which lines the calyx tube, erect, linear or spatulate, free or united by their edges above the base only, their tips imbricate, reflexed. Stamens 5, free, erect; filaments slender, 2 shorter than the others. Ovary sessile, free, subglobose, 2–5-celled and -lobed or -parted; styles 2–5, connate or free, stigma simple or 2–5-lobed; ovules solitary and erect in the cells. Fruit of 2–5 indehiscent, globose, angled or winged cocci, attached to a central column. Testa membranous; albumen fleshy; embryo straight.

The only genus is abundant in Australia, and contains also a Philippine Island species.

### 1. STACKHOUSIA, Smith.

1. **S. minima**, *Hook. f. Fl. N. Z. i. 47*. A minute, slender, glabrous herb, with slender, running rhizomes, sending up erect, leafy branches, 1–2 inches high. Leaves  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, scattered, linear or obovate, acute, fleshy, quite entire. Flowers very minute, in few-flowered spikes. Calyx lobes 5, spreading. Petals united at the middle. Anthers pubescent. Ovary 3-lobed; style 3-cleft. Cocci, usually 1 only ripens.

**Northern** Island: open downs on the east coast, *Colenso*. **Middle** Island: clefts of rocks, Ribbou Wood range, *Haast*.

## ORDER XVIII. RHAMNÆÆ.

Trees or shrubs. Leaves alternate, rarely opposite, stipulate. Flowers regular, hermaphrodite.—Calyx superior or inferior, 4 or 5-toothed or -lobed; lobes triangular, valvate, often having a raised ridge down the centre, and an incurved thickened tip. Petals 0, or 4 or 5, minute, scale-like, very concave, placed between the teeth of the calyx, and often smaller than them. Stamens 4 or 5, very small, inserted with the petals, opposite to, and often hooded by them. Disk hypogynous or epigynous. Ovary superior or inferior, 3-celled; style 1, stigma capitate or 3-fid; ovule solitary and erect in each cell. Fruit of 3 cocci, either free and subtended by the calyx, or more or less immersed in or adnate to the calyx; cocci often crustaceous, lenticular, dehiscing down the inner face. Seed erect; albumen fleshy; embryo large, cotyledons orbicular, radicle straight, terete.

A large temperate and tropical Order, of which the New Zealand genera are Australian.

Ovary inferior. Tomentose shrubs. Leaves alternate . . . . . 1. POMADERRIS.  
 Ovary superior. Spiny, glabrous bush. Leaves 0 or opposite . . . . . 2. DISCARIA.

### 1. POMADERRIS, Labill.

Shrubs, more or less covered with stellate down. Leaves persistent, alternate. Flowers small, in umbellate cymes, usually pedicelled; bracts deciduous.—Calyx tube adnate with the ovary, limb 5-lobed, deciduous or reflexed. Petals 5 or 0. Stamens 5, filaments longer than the petals; anthers free. Disk epigynous. Ovary more or less inferior; style short, trifold. Capsule small, its 3-valved tip free, containing 3 plano-convex cocci, which split down the face, or open by the falling away of an oblong lid.

A considerable genus in Australia, but not found elsewhere, except in New Zealand.

Leaves 2–3 in., elliptic. Cymes many-flowered . . . . . 1. *P. elliptica*.  
 Leaves  $\frac{3}{4}$  in., oblong. Raceme many-flowered . . . . . 2. *P. Edgerleyi*.  
 Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in., linear. Cymes few-flowered . . . . . 3. *P. phyllicifolia*.

1. **P. elliptica**, Labill.;—*Fl. N. Z.* i. 46. A branching shrub or small tree, covered, except on the upper surface of the leaf, with stellate, white or grey down. Leaves 2–3 in. long, elliptic-oblong, obtuse at both ends, or acute at the tip, quite entire, white below; petioles  $\frac{1}{2}$  in. long. Cymes terminal, much branched, very many-flowered, 2–6 in. diam. Flowers fragrant. Calyx tomentose, and covered with silky hairs. Petals with crisped margins.—*P. Kumeraho*, A. Cunn. Prodr.

**Northern** Island: abundant on dry hills, *Banks and Solander*, etc. The same plant is very common in temperate eastern Australia and Tasmania.

2. **P. Edgerleyi**, Hook. f., n. sp. A small bush, more or less covered with yellow stellate pubescence, and ferruginous flocculent tomentum, especially on the young branches. Leaves  $\frac{3}{4}$  in. long, shortly petioled, oblong, obtuse at both ends, above smooth or scabrid, and covered with deeply impressed veins, below with soft, white or red tomentum, and very prominent veins. Racemes lax, few-flowered, flowers imperfect in my specimens.—*Pomaderris*, n. sp.?, *Fl. N. Z.* i. 46.

**Northern** Island: hills south of Wangarei harbour, and Coromandel harbour, *Edgerley, Sinclair, Jolliffe*. Apparently a very rare and local plant, extremely nearly allied to the Australian *P. betulina*.

3. **P. phyllicifolia**, Lodd.;—*P. ericifolia*, Hook.; *Fl. N. Z.* i. 46. A small, erect, fastigiate-branched, heath-like downy shrub, the branches villos. Leaves small,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, spreading, linear-oblong, coriaceous, the margins rolled back to the midrib, obtuse, grooved down the middle above, rather scabrid above with short white hairs. Flowers numerous, in axillary few-flowered cymes, scarcely longer than the leaves, apetalous.—Lodd. Bot. Cab. t. 120.

**Northern** Island: abundant on dry hills, *Banks and Solander*, etc. A common plant in Tasmania.

### 2. DISCARIA, Hook.

Very much branched, glabrous, usually rigid, tortuous, spiny shrubs or small trees, often leafless. Branches decussately opposite, terete, green, transversely

grooved or articulate at the nodes. Flowers axillary, pedicelled, nodding, small, green.—Calyx membranous, inferior or adnate at the base with the ovary, with obconic or campanulate limb and 4 or 5 recurved lobes. Petals 0 or 4 or 5. Stamens 4 or 5. Disk adnate to the base of the calyx, annular, entire or lobed. Ovary free or sunk in the base of the calyx, subglobose, 3-lobed; style slender, stigma 3-lobed. Drupe dry, coriaceous, of 3 cocci, capsular when ripe, the cocci separating and splitting down their faces.

A considerable genus in South America, of which one species is a native of Australia, and another of New Zealand.

1. **D. Toumatou**, *Raoul, Choix*, 29. t. 29;—*D. australis*, Hook., var. *apetala*, Fl. N. Z. i. 47. A thorny bush in dry places, becoming a small tree in damper localities, with spreading branches and branchlets reduced to spines 1–2 in. long. Leaves small,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long, fascicled in the axils of the spines, absent in old plants, linear- or obovate-oblong, obtuse or retuse, smooth or pubescent, quite entire or serrate. Flower  $\frac{1}{3}$  in. diam., apetalous, white; pedicels and calyx minutely downy. Calyx-tube short, obscure; lobes 4 or 5, broadly ovate. Disk broad, with a narrow upturned edge. Capsule size of a peppercorn.—*Notophæna Toumatou*, Miers, Contrib. 272.

East coast and interior of the southern part of the **Northern**, and throughout the **Middle** Island. I have retained this as a distinct species from the Australian plant, relying on the absence of petals and the minute pubescence on the pedicels and flowers. The spines were used in tattooing (*Raoul*). “Wild Irishman” of settlers.

## ORDER XIX. SAPINDACEÆ.

Trees, rarely shrubs. Leaves alternate, rarely opposite, simple or compound, exstipulate. Flowers regular or irregular, uni- or bi-sexual.—Sepals 3–5, imbricate or valvate. Petals 0 or 3–5, generally small, often with a scale on their inner face. Disk 0, or complete or incomplete. Stamens 5–8, hypogynous or inserted within the disk. Ovary entire or lobed, usually 2–3-celled; style simple, stigma 2–3-lobed; ovules 1–2 in each cell, fixed to its axis. Fruit very various. Seeds usually exalbuminous, with large, solid, or spirally-twisted cotyledons and incurved radicle.

A very large and complicated Order of tropical and temperate plants, of which some genera present characters not noticed in the above description.

Leaves simple (in the New Zealand species). Disk 0 . . . . . 1. DODONÆA.  
Leaves pinnate. Disk 8-lobed . . . . . 2. ALECTRYON.

### 1. DODONÆA, Linn.

Shrubs or trees, often covered with a viscid exudation. Leaves simple (or pinnate), exstipulate. Flowers unisexual or polygamous, apetalous, regular.—Sepals 3–5, imbricate or valvate. Male fl.: Disk 0. Stamens 5–8; filaments very short; anthers linear-oblong, 4-angled. Female fl.: Ovary sessile, 3–6-angled; cells 2-ovuled. Capsule membranous or coriaceous, septically 3–6-valved; valves broadly winged at the back. Cotyledons spiral.

A very large Australian genus, of which a very few species (including the New Zealand one) are scattered widely over the warmer regions of the globe.



1. **D. viscosa**, *Forst.*;—*Fl. N. Z.* i. 38. A small glabrous tree, 6–12 ft. high, with very hard wood, variegated black and white, and compressed, viscid young shoots. Leaves 2–3 in. long, on short petioles, linear-obovate, obtuse acute or retuse, quite entire, membranous, veined. Flowers small, in terminal, erect, few-flowered panicles. Sepals ovate, subacute. Anthers large, almost sessile. Fruit  $\frac{1}{3}$  in. long, orbicular, 2-lobed at both ends, on slender pedicels, 2–3-valved; valves with broad, oblong, membranous veined wings. Seeds with dark red-brown testa.—*D. spathulata*, Smith.

Abundant in dry woods, etc., *Banks and Solander*, etc. Wood used for native clubs; also a native of Australia, the Pacific, and the tropics of the Old and New World.

## 2. ALECTRYON, Gærtner.

A lofty tree, with tomentose branchlets. Leaves alternate, unequally pinnate, exstipulate. Panicles branched, axillary and terminal, many-flowered. Flowers small, almost regular, unisexual.—Calyx 4 or 5-lobed; lobes villous within, rather unequal, imbricate. Petals 0. Disk small, 8-lobed. Stamens 5–8, inserted between the lobes of the disk; anthers large, almost sessile. Ovary obliquely obcordate, compressed, 1-celled; style short, stigma simple or 2–3-fid; cell 1-ovuled. Fruit gibbous, pubescent, tumid or globose, with a compressed prominence on one side, rather woody, indehiscent. Seed subglobose, arillate; cotyledons spirally twisted.

1. **A. excelsum**, *DC.*;—*Fl. N. Z.* i. 37. Leaves 4–10 in. long; leaflets alternate, the young ones lobed and cut, serrate in young plants, petiolate, 2–3 in. long, obliquely ovate-lanceolate, acuminate, obscurely crenate, tomentose below, as are the petioles. Panicles 6–8 in. long, much-branched, branches stout and spreading, densely tomentose, as are the flowers. Calyx pilose. Anthers deep-red. Ovary hairy, hidden by the copious hairs at the base of the calyx. Capsule  $\frac{1}{3}$  in. long. Seed globose, in a large scarlet aril.—Hook. Ic. Pl. t. 570.

**Northern and Middle Islands**: in forests not uncommon, *Banks and Solander*, etc. The only species of the genus, and confined to New Zealand. The oil of the seeds was used for anointing the person, according to Cunningham.

## ORDER XX. ANACARDIACEÆ.

Trees. Leaves alternate, simple or compound, exstipulate. Flowers regular, usually small, unisexual or hermaphrodite.—Calyx 3–7-fid or -partite. Petals 3–7 or 0. Disk usually annular. Stamens as many as the petals, alternating with staminodia, or twice as many, inserted on or at the base of the disk; filaments free; anthers versatile. Ovary free, in the female flower 1- or 2–5-celled; in the male often of 4 imperfect carpels; styles 1–3; ovule solitary, pendulous from a basal funicle, or from the wall or top of the cell. Fruit superior, usually 1–5-celled; drupe with hard putamen. Seed exalbuminous; cotyledons thick, fleshy; radicle short.

A very large tropical Order, rarer in temperate climates. The only New Zealand genus is endemic, and allied to the Mango.

1. **CORYNOCARPUS**, Forst.

A small, perfectly glabrous tree. Leaves alternate, broad, bright-green, entire, coriaceous. Flowers in branched terminal panicles, small, green.—Calyx 5-lobed; lobes rounded, imbricate. Petals 5, perigynous, rounded, concave, erect, imbricate, jagged. Disk fleshy, 5-lobed. Stamens 5, inserted between the lobes of the disk, alternating with 5 petaloid jagged scales. Ovary sessile, ovoid, 1-celled, narrowed into an erect style, stigma capitate; ovule pendulous below the top of the cell. Drupe obovoid, fleshy; endocarp coriaceous and fibrous. Seed pendulous; testa membranous, adherent to the cell; cotyledons plano-convex, radicle minute.

1. **C. lævigata**, *Forst.*;—*Fl. N. Z.* i. 48. A leafy tree, 40 ft. high. Leaves 4–7 in. long, oblong or lanceolate, subacute, shining, on short, stout petioles. Panicles erect, thyrsoid, spreading, 4 in. long. Flowers small, globose,  $\frac{1}{8}$  in. diam., greenish-white, inodorous, on short, stout pedicels. Petals as long as the calyx-lobes, concave. Filaments stout, subulate. Ovary small, glabrous. Drupe 1 in. long, oblong.—*Bot. Mag.* t. 4379.

**Northern** and northern part of the **Middle Islands**: abundant near the sea, *Banks and Solander*, etc.; **Chatham Island**, *Dieffenbach*. Pulp of the drupe eatable; embryo considered poisonous till steeped in salt water.

ORDER XXI. **CORIARIEÆ.**

Sarmentose, glabrous, leafy undershrubs, with angular branches. Leaves opposite or rarely 3-nate, exstipulate, entire. Flowers hermaphrodite, solitary or racemed, axillary, regular.—Sepals 5, triangular-ovate, imbricate, persistent. Petals 5, hypogynous, triangular, shorter than the sepals, after flowering becoming fleshy and closely appressed to the carpels. Stamens 10, hypogynous, all free, or 5 of them adnate to the petals; filaments short; anthers large, rough. Carpels 5 or 10, whorled round and adnate to a fleshy torus, 1-celled; styles 5 or 10, free, flexuose, stigmatiferous all over; ovules solitary, pendulous. Fruit of 5–8, small, indehiscent, compressed, oblong, crustaceous achenes, keeled on the back and sides, enclosed in the fleshy petals. Testa membranous; albumen thin; cotyledons plano-convex; radicle very short, superior.

The only genus (of dubious affinity) is a native of southern Europe, the Himalaya, and the South American Andes; the New Zealand species and their forms are all similar to what are found in the latter country. The root of the European species is extensively used for tanning leather in Russia.

1. **CORIARIA**, Linn.

Stems perennial, shrubby. Leaves 1–3 in. long. . . . . 1. *C. ruscifolia*.  
 Stems annual? Leaves ovate or lanceolate,  $\frac{1}{4}$ –1 in. long . . . . . 2. *C. thymifolia*.  
 Stems annual. Leaves narrow-linear, lanceolate,  $\frac{1}{4}$  in. . . . . 3. *C. angustissima*.

1. **C. ruscifolia**, *Linn.*;—*Fl. N. Z.* i. 45. A perennial shrub 10–18 ft. high; trunk 6–8 in. diam.; branches often long and flexuose. Leaves oblong or obovate, acuminate or acute, 3–5-nerved, sessile or shortly petioled. Racemes 8–12 in. long, drooping, many-flowered, pubescent; pedicels  $\frac{1}{3}$  in.,

slender, bracteolate at the base. Flowers  $\frac{1}{8}$ – $\frac{1}{6}$  in. diam., green; anthers in some flowers imperfect. Petals full of purple juice when the fruit is ripe. → *C. sarmentosa*, Forst.; Hook. Bot. Mag. t. 2470.

Abundant throughout the islands, *Banks and Solander*, etc. **Kermadec Island**, *M'Gillivray*. The so-called berries (fleshy petals) of this and the following species vary much in succulence, the less juicy bearing seeds which, according to Colenso, are not poisonous. The juice is purple, and affords a grateful beverage to the natives; and a wine, like elderberry wine, has been made from it. The seeds alone are said by some (the whole plant by others) to produce convulsions, delirium, and death, like those of the European *C. myrtifolia*. This species is abundant in Chili. The Tua-tutu of Otago.

2. ***C. thymifolia***, *Humb.*;—*Fl. N. Z.* i. 45. A much smaller, annual?, usually more pubescent plant than *C. ruscifolia*, sometimes only a foot or so high, with small, ovate-lanceolate leaves, shorter racemes, and smaller flowers; large forms of it however seem to be connected with smaller ones of the former, both in New Zealand and America.

Common in various dry places throughout the islands, ascending to 5000 ft: **Kermadec Island**, *M'Gillivray*. In America it ranges from Mexico to Peru, at elevations of 4–12,000 ft. The small ground Tutu of Otago.

3. ***C. angustissima***, *Hook. f. n. sp.* A small bright green annual species, 6–18 in. high, with the habit of *C. thymifolia*, but the branches are glabrous, very slender, more dense, and the leaves are very narrow linear-lanceolate or subulate,  $\frac{1}{4}$  in. long.

**Northern Island**: Mount Egmont, *Dieffenbach*; top of the Ruahine range, *Colenso*. **Middle Island**: abundant in subalpine localities from Nelson, *Sinclair*, to Otago, *Hector and Buchanan*. I think this certainly passes into *C. thymifolia*, but all my New Zealand correspondents regard it as a distinct species. The annual herbaceous Tutu of Otago.

## ORDER XXII. LEGUMINOSÆ.

### Tribe PAPILIONACEÆ.

Herbs, shrubs, or trees. Leaves alternate (rarely opposite), stipulate, mostly compound; leaflets usually entire. Flowers irregular, hermaphrodite. —Calyx 5-toothed or -cleft, or 4-toothed by the union of the upper lobes. Corolla papilionaceous, *i. e.* of 5 petals, the upper (standard) broadest, outside in bud, often reflexed; the 2 next lateral (wings), vertical and parallel; the 2 lowest also vertical and parallel within the wings (forming the keel), often combined by their lower edges. Stamens 10, 9 usually united into a membranous tube sheathing the ovary, the upper free, rarely all free. Ovary sessile or stipitate, generally long, flattened, 1-celled, tapering into a straight or upturned style; stigma small, simple, lateral or capitate. Fruit a 1- or more seeded *Legume*, splitting into 2 valves in all the N. Z. genera, except *Carmichaelia*. Seeds exalbuminous; cotyledons thick, plano-convex; radicle short.

A very large tribe, belonging to one of the largest Natural Orders on the globe, which includes the Pea, Bean, and all Legumes proper. The Order abounds in Australia, forming there a great proportion of the indigenous vegetation, herbaceous shrubby and arboreous, but is less developed in New Zealand than in any other part of the world, temperate or tropical. Shrubs. Leafless, or leaflets in 1–3 pairs. Flowers small . . . 1. *CARMICHAELIA*. Tree, with pendulous chord-like branchlets, leafless. Flowers pink . . . 2. *NOTOSPARTIUM*.

- Herb, with leaflets in several pairs. Flowers blue . . . . . 3. SWAINSONIA.  
 Herbaceous. Leaflets in many pairs. Flowers large, scarlet . . . . 4. CLIANTHUS.  
 Shrubs or trees. Leaflets in many pairs. Flowers large, yellow . . . 5. EDWARDSIA.

### 1. CARMICHÆLIA, Br.

Shrubs or small trees, usually quite leafless, or leafy in a young state only; branches terete or more often flattened, grooved or striate, green. Leaflets in 1-3 pairs, obcordate. Flowers small, pink bluish or white, in small lateral fascicles or racemes, inserted in notches on the edges of the branchlets. —Calyx short, cup-shaped or campanulate, truncate, 5-toothed. Standard orbicular, usually reflexed. Wings more or less falcate, obtuse, auricled at the base. Keel oblong, incurved, obtuse. Upper stamen more or less free from the others. Ovary narrowed into a slender curved style, beardless, stigmatiferous at the very tip; ovules numerous, 2-seriate. Pod small, oblong or orbicular, straight or oblique, with a short or long rigid subulate beak, thick, very coriaceous; valves opening at the tip only, or with the centre falling away from their persistent consolidated edges. Seeds 1-3, oblong or reniform; funicle not thickened, radicle with a double flexure.

A most singular genus, confined to New Zealand, unique as regards the structure of the pod, in which the edges of the valves become consolidated, and their faces either open towards the tip as valves, or fall altogether away. Besides the species here described (which are very difficult of discrimination), I have apparently several others, especially from the Middle Island, which may be new, but not having seen fruit, I hesitate to describe them. Intermediates will probably be found between several of the following.

\* Flowers  $\frac{1}{2}$  to  $\frac{1}{3}$  in. long.

- |   |                             |
|---|-----------------------------|
| Branches cylindric, grooved. Flowers subcapitate. Calyx woolly . .  | 1. <i>C. crassicaulis</i> . |
| Branches compressed. Flowers in 3-5-flowered, lax, pubescent racemes Dwarf; branches flat. Flowers in lax, 1-3-flowered, nearly glabrous racemes, with long peduncles . . . . . | 2. <i>C. Munroi</i> .       |
| Branchlets flat or terete, grooved. Flowers 6-8, subcapitate, glabrous.   | 3. <i>C. nana</i> .         |
|   | 4. <i>C. grandiflora</i> .  |

\*\* Flowers less than  $\frac{1}{2}$  in. long.

† Ovary pubescent.

- |   |                       |
|---|-----------------------|
| Branchlets flat, grooved. Flowers 8-12, in erect, silky racemes . . | 5. <i>C. pilosa</i> . |
|---|-----------------------|

†† Ovary quite glabrous.

- |   |                               |
|---|-------------------------------|
| Branchlets flat, striate. Flowers in lax, 5-8-flowered, glabrous or slightly pilose racemes. Pod $\frac{1}{2}$ in., with usually a very short beak.             | 6. <i>C. australis</i> .      |
| Branchlets flat or terete. Flowers in erect, 8-12-flowered, very pubescent racemes. Pod $\frac{1}{2}$ in., with a long, subulate beak . . . . .                 | 7. <i>C. odorata</i> .        |
| Branchlets very slender, flat. Flowers in lax, 3-6-flowered, pilose racemes or fascicles, on slender pedicels. Pods $\frac{1}{4}$ in., with long straight beak. | 8. <i>C. flagelliformis</i> . |
| Branchlets very slender, terete or flat. Flowers in small, 2-6-flowered, pilose spreading racemes. Pod minute, $\frac{1}{10}$ — $\frac{1}{8}$ in. . . . .       | 9. <i>C. juncea</i> .         |

1. *C. crassicaulis*, Hook. f., n. sp. Branchlets very robust, cylindric,  $\frac{1}{2}$  in. diam., with many deep, parallel, tomentose grooves. Leaves not seen. Flowers in rounded fascicles of 6-12,  $\frac{1}{4}$ — $\frac{1}{3}$  in. long, shortly pedicelled. Calyx and pedicels densely woolly, lobes of the former ovate obtuse; bracteoles at its base minute. Standard large, reflexed. Ovary densely villous, with white silky hairs. Pod unknown.

Middle Island: Mount Torlesse range, alt. 3500 to 5000 ft., and old moraines round Lake Okau, Haast; Otago, Lindis Pass, Hector and Buchanan. A very fine species, at



once known by its stout deeply-grooved branches, capitate inflorescence, large flowers, woolly calyx with large lobes, and villous ovary.

2. **C. Munroi**, *Hook. f., n. sp.* Branchlets stout, slightly or much compressed,  $\frac{1}{8}$  in. diam., striated, not grooved, quite glabrous. Leaves not seen. Flowers  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, in few lax-flowered racemes. Pedicels very slender, as long as or longer than the calyx, hoary. Calyx hoary, with rather large blunt teeth; bracteoles at the base minute. Standard shorter than, or as long as the wings. Ovary glabrous. Pod unknown.

**Middle Island**: from halfway up to the summit of Macrae's Run, *Munro*. The very stout habit, and lax, large-flowered racemes, best distinguish this.

3. **C. nana**, *Col.*;—*C. australis*, var.  $\beta$ . *nana*, Benth. in Fl. N. Z. i. 50. A very dwarf, glabrous, rigid shrub, 2 to 4 in. high, with fascicled, leafless, much compressed, minutely striated, erect branchlets,  $\frac{1}{12}$ – $\frac{1}{8}$  in. diam. Flowers  $\frac{1}{4}$ – $\frac{1}{3}$  in. long; peduncles long, slender, glabrous, 1–5-flowered, sometimes 1 in. long. Calyx shorter than the slender pedicels, glabrous or sparsely pilose, lobes rather large and obtuse; bracteoles at the base minute. Standard about as long as the wings. Ovary quite glabrous. Pod linear-oblong,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, with a short straight beak like the pod of *C. australis*.

**Northern Island**: dry mountainous country at the base of Tongariro, *Colenso*; **Middle Island**: Upper Motucka valley, *Munro*; Southern Alps, *Sinclair and Haast*; Otago, Lindis Pass and Waitaki river, *Hector and Buchanan*. Though very unlike *C. grandiflora*, I should not be surprised if this were proved to be a state of that plant. It keeps its characters in both islands.

4. **C. grandiflora**, *Hook. f.*—*C. australis*, var.  $\gamma$ . *grandiflora*, Benth. in Fl. N. Z. i. 50. A much branched, glabrous shrub; branchlets terete or compressed,  $\frac{1}{12}$ – $\frac{1}{8}$  in. broad, deeply grooved, often leafy. Leaflets 3, narrowly or broadly obcordate-cuneate, glabrous. Flowers  $\frac{1}{4}$  in. long, in peduncled, lax, broad, obtuse, loose, 6–8-flowered, glabrous racemes, on slender pedicels half as long as the calyx. Calyx glabrous, with large, obtuse, ciliate lobes, and minute bracteoles at its base. Standard much larger than the wings. Ovary glabrous. Pods in nodding racemes, narrow oblong,  $\frac{1}{4}$  in. long, gradually narrowed into a subulate beak  $\frac{1}{8}$  in. long. Seeds 2, pale brown.

**Middle Island**: Milford Sound, *Lyall*; river beds, Mount Cook, and elsewhere in the Southern Alps, alt. 2500 to 4500 ft., *Haast*; Otago, lake district, alt. 1500 ft., *Hector and Buchanan*. A very distinct looking species, best known by the large flowers, glabrous racemes, deeply grooved branches, 3-foliate leaves, large calyx-lobes, and small pod with a long beak.

5. **C. pilosa**, *Col. in Fl. N. Z. i. 50.* A much distichously branched shrub; branchlets more or less silky-pubescent at the tips, notched alternately on either side, much compressed,  $\frac{1}{12}$ – $\frac{1}{8}$  in. broad, flexuose, deeply grooved. Leaves not seen. Flowers minute,  $\frac{1}{8}$  in. long, in small, erect, dense, 10–15-flowered, silky racemes, suberect; pedicels very short. Calyx nearly glabrous; teeth very short; bracteoles minute, at its base or on the pedicel. Standard much larger than the upturned wings. Ovary silky. Pods small, in pendulous racemes,  $\frac{1}{4}$  in. long, tapering into a subulate straight beak  $\frac{1}{10}$  in. long. Seeds not seen.

**Northern Island**: east coast, *Colenso*. This has the grooved branchlets of *C. grandiflora*.

*flora* and others, and the racemes of *C. odorata*, but the silky ovary distinguishes it from these and all its congeners, except *C. crassicaulis*.

6. ***C. australis*, Br.**;—*Fl. N. Z.* i. 50, *excl. var.* An erect, much branched shrub or small tree; branchlets elongated, quite flat, straight,  $\frac{1}{4}$ — $\frac{1}{2}$  in. broad, finely striated, with distant alternate notches. Leaflets 1 or 2 pairs, membranous, broadly or narrowly obovate-cordate or obcuneate, quite glabrous. Flowers small,  $\frac{1}{8}$  in. long, in small, 5–8-flowered, erect or spreading, glabrous or slightly pilose racemes; pedicels about as long as the calyx. Calyx nearly glabrous, with very small obtuse teeth. Standard broad, longer than the wings. Ovary quite glabrous. Pod oblong, spreading,  $\frac{1}{3}$  in. long, suddenly narrowed to a short or rather long acute beak; valves not wrinkled. Seeds 1–4, dull red.—*Bot. Reg.* t. 912; *C. Cunninghamii*, Raoul, Choix, t. 28 B; *C. stricta*, Lehm.; *Bossicea Scolopendra*, A. Rich.; *Lotus* (?) *arboreus*, Forst.

Common along the east coasts and interior of the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. The branchlets are sometimes upwards of  $\frac{1}{2}$  in. broad, but this appears to be rather an anomalous than a normal state of the plant. The pod has rarely a subulate beak, as in *C. flagelliformis*; it is so in authentic specimens of Lehmann's *C. stricta*, however.

7. ***C. odorata*, Col.** in *Fl. N. Z.* i. 50. A much-branched shrub; branchlets distichous, terete compressed or plano-convex,  $\frac{1}{12}$ — $\frac{1}{10}$  in. broad, deeply grooved, pubescent towards the tips. Leaves small, silky-pubescent on both sides; leaflets in 2 pairs, very small,  $\frac{1}{6}$ — $\frac{1}{8}$  in. long, narrow oblong, obcuneate, 2-lobed at the tip. Flowers minute,  $\frac{1}{10}$ — $\frac{1}{8}$  in. long, in numerous, small, erect, many-flowered, pubescent racemes, very shortly pedicelled; bracteoles minute, on the pedicel. Calyx-teeth rather long, acute. Pods in pendulous racemes, exactly like those of *C. pilosa*.

**Northern and Middle Islands**: east coast, *Colenso*; Nelson, *Travers*, *Munro*; Otago, lake district, *Hector* and *Buchanan*. Very similar indeed to *C. pilosa*, from which the glabrous ovary at once distinguishes it.

8. ***C. flagelliformis*, Col.** in *Fl. N. Z.* i. 51. A much branched shrub, with almost fastigiate, numerous, very slender, compressed, rarely plano-convex grooved branchlets,  $\frac{1}{16}$ — $\frac{1}{10}$  in. broad. Leaves not seen. Flowers minute,  $\frac{1}{10}$ — $\frac{1}{8}$  in. long, in pubescent, lax, 3–6-flowered fascicles or open racemes; pedicels very slender; bracteoles above the middle, or below the calyx. Pods oblong or obliquely orbicular, about  $\frac{1}{3}$  in. long, with a stout, subulate, straight beak  $\frac{1}{12}$  in. long. Seeds mottled with yellow or red, brown and black.—*C. australis*, Raoul, Choix, t. 28 A.

**Northern and Middle Islands**: east coast, *Colenso*; Milford Sound, *Iyall*; Nelson, *Bidwill*; Otago, *Lindsay*; Akaroa, *Raoul*. This is possibly the true *Lotus* (?) *arboreus*, Forst., but it differs from *C. australis*, Br. in the narrow grooved branchlets, pubescent racemes, and in the pod.

9. ***C. juncea*, Col.** in *Fl. N. Z.* i. 51. A small, slender shrub, a foot or less high, with very slender, compressed, often curved, grooved branches and branchlets, less than  $\frac{1}{12}$  in. broad. Leaves not seen. Flowers minute,  $\frac{1}{10}$ — $\frac{1}{8}$  in. long, in loose, small, nearly glabrous or puberulous 4–8-flowered fascicles; pedicels curved, about as long as the calyx or longer, bracteolate below it. Calyx small, rather membranous; lobes small, rather acute. Ovary

quite glabrous; style hooked. Pod very minute,  $\frac{1}{10}$ – $\frac{1}{12}$  in. long, turgid, ovoid-oblong, with a slender, curved, subulate beak. Seeds not seen.

**Northern** Island: East Cape, *Sinclair*; east coast, Hawke's Bay and Taupo, *Colenso*.  
**Middle** Island: Akaroa, *Raoul*; Canterbury plains, *Travers*.

## 2. NOTOSPARTIUM, Hook. f.

A shrub or small tree, with slender branches and pendulous branchlets like whipcord. Leaves not seen. Flowers rather small.—Calyx campanulate, truncate; teeth 5, short. Standard obovate-obcordate, not auricled at the base. Wings oblong, with an incurved auricle at the base, shorter than the hatchet-shaped keel. Stamens diadelphous. Ovary nearly sessile, linear, tapering into a curved style, which is ciliated on the inner margin; ovules 8–10. Pod shortly stipitate, linear-elongate, with a slender style, curved, torulose, compressed, membranous, indehiscent, many-jointed, many-seeded. Seeds solitary in the cells, oblong, with a doubly-bent and twisted club-shaped radicle.

A most curious genus, allied in habit, and many other respects, to *Carmichaelia*, but widely differing from it, and from all others known to me.

1. **N. Carmichaeliæ**, Hook. f. in *Kew Journ. Bot.* ix. 176. t. 3. A small tree, with weeping branches and pink flowers. Branchlets 1 ft. or more long, compressed, grooved,  $\frac{1}{20}$  in. broad, remotely toothed, giving off at the teeth many-flowered racemes 1–1½ in. long. Peduncle and short pedicels pubescent. Flowers  $\frac{1}{4}$ – $\frac{1}{3}$  in. long. Pods 1 in. long,  $\frac{1}{12}$  broad.

**Middle** Island: Canterbury province, *Waitts*; sandy and rocky places on the Waihopai river, *Munro*; Upper Awatere, *Sinclair*, "Pink Broom."

## 3. SWAINSONIA, Salisbury.

Herbs; stems prostrate erect or climbing, sometimes woody at the base. Leaves unequally-pinnate, stipulate; leaflets many. Flowers in axillary peduncled racemes.—Calyx campanulate, 5-toothed. Standard broad, open or reflexed, orbicular. Wings narrow, auricled at the base, as long as or shorter than the obtuse keel. Style slender, bearded on the upper or inner edge; ovules many. Pod ovate oblong or terete, inflated or turgid, acute. Seeds rather small.

A large Australian genus, representing *Astragalus* of other parts of the world, from which it is distinguished chiefly by the broader, more expanded standard.

1. **S. novæ-Zelandiæ**, Hook. f., n. sp. A small, low, sparingly-branched herb, covered with minute silky pubescence; branches 2–4 in. long. Leaves 1–2 in. long; leaflets opposite,  $\frac{1}{4}$  in. long, sessile, obovate-oblong, obtuse or retuse; stipules ovate, obtuse. Peduncle 1 in. long, bearing 5–8 racemed flowers. Flowers purple,  $\frac{1}{3}$  in. long; pedicels rather shorter than the calyx, bracteate at the base. Calyx with rather long teeth, villous within and on the edges, 2-bracteolate. Standard without callosities; keel and wings nearly equal, straight. Pod large, nearly 1 in. long,  $\frac{1}{3}$  broad, acute at both ends, puberulous; valves thin, coriaceous. Seeds small.

**Middle** Island: sources of the Kowai, in shingly river-beds, alt. 2000–2500 ft., *Haast*. Very nearly allied to the Tasmanian *S. lessertiaefolia*, which is a larger plant, with many-

flowered racemes, more obtuse shorter calyx-teeth, less villous within, usually more abundant blackish hairs on the inflorescence, and more curved keel.

#### 4. CLIANTHUS, Solander.

Herbs; stems woody below, branches often trailing. Leaves pinnate, stipuled; leaflets many pairs. Flowers large, red, in pendulous racemes. —Calyx campanulate, 5-toothed. Standard ovate, reflexed, about as long as the keel. Wings oblong or lanceolate, auricled at the base, shorter than the boat-shaped keel. Ovary stipitate; style ciliated below the apex; ovules numerous. Pod stipitate, terete, narrow-oblong, turgid, rostrate, many-seeded.

A genus of most beautiful plants, consisting of an Australian (Sturt's Pea) and a New Zealand species.

1. **C. puniceus**, Banks and Sol.;—*Fl. N. Z.* i. 49. A branching, herbaceous undershrub, with prostrate or reclining branches, more or less covered with silky appressed hairs. Leaves 4–6 in. long, unequally pinnate. Leaflets in 10–14 pairs, alternate, sessile,  $\frac{1}{2}$ –1 in. long, linear-oblong, obtuse; stipules triangular. Flowers 6–15 in a raceme, scarlet, pendulous, 2 in. long. Calyx  $\frac{1}{3}$ – $\frac{1}{2}$  in. long. Standard ovate, acuminate, reflexed when fully expanded. Wings falcate, acute or obtuse, half as long as the standard. Keel very large, boat-shaped, falcate, narrowed into a long beak.—*Bot. Reg.* t. 1775.

**Northern** Island: east coast, Banks and Solander, etc., and various other localities, especially near native dwellings, etc. One of the most beautiful plants known; often cultivated in European greenhouses; variable in depth of colour of flower.

#### 5. SOPHORA, Linn.

Small trees or twiggy shrubs. Leaflets in many pairs. Flowers pendulous, large, yellow in the N. Z. species.—Calyx rather inflated, urceolate hemispherical or campanulate; mouth oblique, obscurely 5-toothed. Standard obovate, very broad, shortly clawed. Wings oblong, stipitate, shorter than the straight obtuse keel. Stamens 10, all free. Ovary stipitate, linear; style slender, slightly curved, glabrous, stigma minute; ovules numerous. Pod stipitate, elongate, moniliform terete angled or 4-winged, indehiscent or 2-valved, few- or many-seeded. Seeds oblong; funicle not thickened.

A very large genus of tropical, subtropical, and Central Asiatic trees, of which the species with 4-winged pods were separated as *Edwardsia*, before it was discovered that the genus presents pods of all intermediate forms between terete, 4-angled, and 4-winged.

1. **S. tetraptera**, Aiton;—*Edwardsia grandiflora*, Salisb.; *Fl. N. Z.* i. 52. A small or middling-sized tree, variable in habit, foliage, and size of flower; branches in young plants slender, flexuose, in old straight, densely covered with fulvous silky tomentum. Leaves exstipulate, 1–6 in. long, petiole slender or stout, covered with silky or ferruginous hairs; leaflets 6–40 pairs, very variable, from broadly obcordate to linear-oblong,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, rounded retuse or 2-lobed at the tip, on young plants smaller broader glabrous and membranous, in old silky or densely villous on one or both surfaces. Flowers 1–2 in. long, yellow, in axillary, pendulous, 4–8-flowered racemes; peduncles short, pedicels  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long, flexuose, and calyx densely



silky. Calyx rather gibbous,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, hemispherical or urceolate, mouth very oblique. Standard hardly reflected, always short obtuse. Wings linear-oblong. Keel nearly straight. Pods 1–5 in. long, the joints oblong, 4-angled, with 4 membranous wings, the outer walls separating from the coriaceous inner; valves hardly dehiscent. Seeds oblong, pale yellow-brown; cotyledons almost consolidated.

Var. *α. grandiflora*. Larger and more robust. Trunk sometimes 1–3 feet diam. Leaflets in 10–30 pairs, usually narrow. Flowers 2 in. long, narrower. Standard  $\frac{1}{4}$  shorter than the wings.—*S. tetraptera*, Bot. Mag. t. 167; *Edwardsia grandiflora*, Salisb.

Var. *β. microphylla*. Smaller; young branches very slender and flexuose, with few obovate membranous leaflets. Leaflets of old plants in 30–40 pairs, oblong-obcordate. Flowers 1– $1\frac{1}{2}$  in. long, broader. Standard little shorter than the wings.—*S. microphylla*, Jacq. Hort. Schœnb. t. 269; *Edwardsia microphylla*, and *Macnabiana*, Bot. Mag. t. 1442 and 3735.

Abundant throughout the islands, *Banks and Solander*, etc. I am quite unable to find permanent characters whereby to distinguish the two varieties, the wild specimens presenting intermediate ones; the extreme forms are very distinct, and remain so under cultivation. The var. *β*, and forms approaching *α*, are both common in South Chili and Juan Fernandez. Wood of var. *α* valuable for fencing and veneers; heartwood red, *Buchanan*.

Amongst the many cultivated *Leguminosæ*, several have run wild in New Zealand, and the number of colonists will annually increase; the only one known to me, however, as being generally diffused, is the common White Clover (*Trifolium repens*, Linn.).

*Eutaria Strangeana*, Turezanihow (Bull. Soc. Imp. Mosc. 1853, vol. ii. p. 270), is stated by its author to have been discovered in New Zealand, no doubt through some blunder; the genus is exclusively a West Australian one.

*Guilandina Bonduc*, Linn., a tropical, prickly, climbing, pinnate-leaved shrub, is stated by Forster to be a native of New Zealand, but erroneously.

## ORDER XXIII. ROSACEÆ.

Herbs shrubs or trees, erect or climbing; stems sometimes prickly or spinose. Leaves alternate, simple or compound, stipulate. Flowers regular, usually hermaphrodite.—Calyx-tube short and open, or urceolate and enclosing the carpels; lobes 4 or 5 or 0, often valvate. Petals 4 or 5, rarely 0, spreading, imbricate. Stamens numerous, few in *Acæna*, free, inserted on a perigynous ring or on the mouth of the calyx-tube; filaments subulate; anthers short, didymous. Carpels 1 or more, 1-celled, small, enclosed in the calyx-tube, or free and clustered on a torus; style lateral basal or terminal, stigma capitate; ovules 1 or 2. Fruit of 1 or more small achenes, free or enclosed in the calyx-tube, or of many small free succulent drupes. Seeds exalbuminous; testa membranous; cotyledons plano-convex, radicle short.

The above description applies chiefly to the New Zealand genera of this very extensive and universally-distributed Order, which embraces several tribes (including those of the Apple, Rose, Peach, Cherry, Strawberry, etc., in some of which the calyx is apparently inferior) that do not occur in these islands, and differ in some respects from the character above given.

Shrub, with climbing prickly stems. Fruit of many small drupes . . .	1. RUBUS.
Herb, with pinnate leaves. Achenes many, with short styles . . .	2. POTENTILLA.
Herbs, with simple or pinnate leaves. Achenes many, with elongated bent styles . . .	3. GEUM.
Herbs, with pinnate leaves. Achenes 1 or 2, enclosed in the calyx-tube . . .	4. ACÆNA.

1. **RUBUS**, Linn.

Climbing shrubs (rarely erect or herbaceous); stems usually prickly. Leaves simple or compound. Flowers paniced (rarely solitary).—Calyx-tube open; lobes 5, large, persistent. Petals 5, rarely more, orbicular or obovate. Stamens numerous. Carpels numerous, small, crowded on a small torus; style lateral or subterminal, short, stigma capitate; ovules 2, pendulous. Fruit of small, globose, fleshy drupes.

A very large genus (to which the Bramble, Raspberry, and Dewberry belong), especially in the west of Europe and Himalaya mountains, found also in almost all other parts of the world, except the hottest and driest.

1. **R. australis**, *Forst.*;—*Fl. N. Z.* i. 53. t. 14. A lofty climber, armed with scattered-recurved prickles; branches very slender, pendulous. Leaves coriaceous, 3-5-nate, or pinnate with 2 pairs of leaflets and a terminal one; leaflets on long petioles, very variable in shape, ovate cordate oblong lanceolate or reduced to prickly midribs, 2-5 in. long, coarsely serrate or toothed, shining above, glabrous pubescent or tomentose beneath. Flowers very numerous, in branched, prickly, downy panicles,  $\frac{1}{3}$ - $\frac{1}{2}$  in. diam., fragrant. Calyx-lobes ovate, obtuse. Petals linear-oblong, pink or whitish. Stamens numerous. Female flowers rarer. Drupes numerous, with short, subterminal styles, when ripe yellowish, juicy, austere.

Var. *a. glaber*, *Fl. N. Z.* i. c. Leaflets 3-5-nate or pinnate, ovate-cordate, glabrous.

Var. *B. schmidelioides*, *Fl. N. Z.* i. c. Leaflets 3-5-nate or pinnate, ovate or cordate, pubescent or tomentose below.—*R. schmidelioides*, A. Cunn.

Var. *γ. cissoides*, *Fl. N. Z.* i. c. Leaflets 3-5-nate, quite glabrous, linear or elliptical-lanceolate, sometimes reduced to midribs.—*R. cissoides*, A. Cunn.

Abundant in the skirts of woods throughout the islands, *Banks and Solander*; and all the varieties found as far south as Otago. Probably the same as an Australian species of which I have seen incomplete specimens only. These varieties, though united by every intermediate form, keep their characters under cultivation.

2. **POTENTILLA**, Linn.

Herbs (or rarely small shrubs), often silky woolly or pubescent, with compound (rarely simple) leaves, and 1- or more flowered leafy scapes or peduncles. Flowers hermaphrodite.—Calyx-tube open; lobes 4 or 5, alternating with 4 or 5 smaller outer lobes or bracteoles, persistent, valvate. Petals 4 or 5, orbicular or obcordate. Stamens numerous. Ovaries numerous, small, crowded on a small torus; styles lateral or basal, stigmas capitate; ovule 1, pendulous. Achenes numerous, dry, with small styles.

A very large genus in the northern temperate and arctic zones, very rare in the southern.

1. **P. anserina**, *Linn.*;—*Fl. N. Z.* i. 54. A small stemless plant, everywhere covered with silvery hairs; root emitting slender runners. Leaves 3-6 in. long, unequally pinnate; leaflets 5-20 pairs, the alternate ones sometimes very small, ovate oblong or rounded, deeply incised. Scapes erect, villous, 1-flowered, as long as the leaves. Flowers  $\frac{1}{2}$ -1 in. diam. Calyx very silky and villous. Petals obovate, golden-yellow. Achenes and receptacle villous.

Var. *B.* Leaflets small, rounded, sessile or petioled.—*P. anserinoides*, Raoul.

Abundant on the east side of all the islands. Var.  $\beta$ , most common, *Banks and Solander*, etc. This is a cosmopolite plant, being found almost throughout temperate and arctic Europe, Asia and America, also in Tasmania, but the var.  $\beta$  is confined to New Zealand.

### 3. GEUM, Linn.

Herbs with perennial rootstocks, more or less pilose; stems erect, leafy, 1- or more flowered. Radial leaves pinnate, often reduced to one large lobed leaflet.—Calyx-tube open; lobes 5, alternating with 5 smaller outer lobes or bracteoles. Petals 5, orbicular or obovate. Stamens numerous. Ovaries numerous, small, crowded on a small torus; style terminal, elongating after flowering, and then jointed bent or twisted at the middle; ovule solitary, ascending. Achenes dry, hairy, with very long, slender, hairy styles. Seed ascending.

A considerable genus, common in temperate regions, both of the north and south hemisphere. The root of one species is an astringent, and used in medicine.

Two to three feet high. Leaves interruptedly pinnate . . . . . 1. *G. urbanum*.  
Six inches to one foot high. Leaves with a large terminal leaflet . . . 2. *G. parviflorum*.

1. *G. urbanum*, Linn., var. **strictum**;—*G. magellanicum*, Commerson; Fl. N. Z. i. 55. A strict, rigid, leafy, erect, hairy silky or villous herb, 2-3 ft. high, with woody, stout rhizome. Leaves alternate, 3-6 in. long, pinnate; leaflets 3-6 pairs, 1-5 in. long, subsessile, very variable, ovate obovate or obuneate, erenate toothed lobed or pinnatifid, alternate pairs often smaller, terminal much larger, lobed and cut; stipules large and leafy. Flowers  $\frac{1}{2}$ -1 in. across. Calyx-lobes triangular-ovate, and peduncles pubescent. Petals obovate, bright yellow, longer than the calyx. Carpels very numerous, densely villous, collected in a globose or oblong head; styles slender, deflexed, abruptly bent or twisted once towards the nearly glabrous apex; the portion beyond the bend is often broken off, when the style appears hooked at the top.

Common in the central and southern subalpine parts of the **Northern** Island, and throughout the **Middle** Island, *Banks and Solander*, etc. Also found in Tasmania, South and North temperate America, along the Andes to Fuegia, and in central and eastern Asia. It differs from the European *G. urbanum* chiefly in the stronger habit and larger petals.

2. *G. parviflorum*, Commerson;—Fl. N. Z. i. 56.—A small, silky or villous herb, 4-18 in. high, rhizome stout woody. Leaves 3-5 in. long, pinnate; leaflets 6-8 pairs, all very small, sessile, lobed and toothed; terminal very large, rounded-reniform, 1-2 in. broad, crenate. Flowers rather crowded towards the ends of the stems, about  $\frac{1}{2}$  in. across. Calyx-lobes broadly ovate, obtuse. Petals yellow (sometimes white?), longer than the calyx. Styles subulate, tips hooked, villous with long hairs.—*Sieversia albiflora*, Fl. Antaret. i. 9. t. 7.

**Northern** Island: Ruahine Mountains, Colenso. **Middle** Island: common in subalpine localities, 2-5000 ft. alt., from Nelson, *Sinclair*, to Otago, *Hector*. **Lord Auckland's** group, *J. D. H.* Also found in S. Chili and Fuegia.

### 4. ACÆNA, Vahl.

Perennial herbs, stemless, or with prostrate, branching stems. Leaves radical, numerous, pinnate. Seapes slender, bearing dense, globose heads

or spikes of minute hermaphrodite flowers.—Calyx-tube urceolate or obconic, with very contracted mouth, terete compressed or 4-angled, smooth or hispid with simple or barbed bristles, angles often bearing stiff spines barbed at the tip; limb 0. Petals 4 or 5 small, deciduous, sometimes connate at the base. Stamens 1-5; filaments short, subulate. Ovaries 1 or 2, wholly immersed in the calyx-tube; style subterminal, short, exserted, stigma capitate, plumose or fimbriate; ovule pendulous. Achene enclosed in the indurated, often armed calyx-tube; pericarp membranous, bony or coriaceous.

A remarkable genus, almost confined to the southern temperate and antarctic regions, the exceptions being a few Polynesian and Mexican species, and one Chilean, which is also found in California. The barbed calyces of various species form burrs, which in some pastures in Australia adhere to the sheep in such quantities as seriously to injure the fleece.

Fruiting calyx with 4 barbed spines. Leaves very silky . . . . .	1. <i>A. Sanguisorbæ</i> .
Fruiting calyx with 4 barbed spines. Leaves glabrous . . . . .	2. <i>A. adscendens</i> .
Fruiting calyx glabrescent, with 4 usually simple red spines . . . . .	3. <i>A. microphylla</i> .
Fruiting calyx villous, with 4 usually simple yellow spines . . . . .	4. <i>A. Buchanani</i> .
Fruiting calyx without spines. Leaflets minute . . . . .	5. <i>A. inermis</i> .

1. ***A. Sanguisorbæ*, Vahl;—Fl. N. Z. i. 54.** A much branched, prostrate herb; branches rather woody at the base, tips ascending, leafy, more or less silky, especially on the leaves below, variable in size. Leaves 2-6 in. long; leaflets 8-10 pairs, very variable in shape, oblong orbicular or obovate, membranous, coarsely serrate,  $\frac{1}{4}$ – $\frac{2}{3}$  in. long, the upper pairs rather larger than the lower. Scapes slender, 1-2-leaved. Heads globose,  $\frac{1}{3}$ – $\frac{1}{2}$  in. diam. Calyx 4-angled; angles produced into purple bristles  $\frac{1}{2}$  in. long, barbed at the tip. Petals 4, united at the base. Stamens 2. Stigma dilated, feathery.—*A. anserinaefolium*, Forst. Prodr.; *Ancistrum diandrum*, Forst. Char. Gen.

Abundant throughout the islands, *Banks and Solander*, etc., from **Kermadec** Islands, as far south as **Lord Auckland's** group, **Campbell's** and **Macquarrie** Islands. Leaves used medicinally and as tea by the natives of the Middle Island, *Lyall*. Also a native of *Tristau d'Acunha*, Australia, and Tasmania, where the heads called *burrs* are pests to the flocks, and the plant itself is a troublesome weed in gardens.

2. ***A. adscendens*, Vahl;—Fl. Antarct. i. 10; ii. 268. t. 96.** A prostrate, glabrous or slightly hairy herb, with rather stout, leafy stems. Leaves 2-4 in. long; leaflets 4-6 pairs, coriaceous,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, coarsely deeply cut towards the obtuse tip, cuneate at the base, teeth obtuse, often tipped with silky hairs. Scape almost leafless, glabrous. Heads  $\frac{1}{2}$  in. across. Flowers greenish, calyx-tube silky or glabrous, 4-angled, the angles produced into purple bristles barbed at the tip. Petals 4, broad, greenish. Stamens 1-4; filaments long. Stigma linear.

**Middle Island**: Mountain districts, alt. 4-7000 ft., *Nelson, Munro and Sinclair*; *Canterbury, Haast and Travers*; *Otago*, lake district, *Haast and Buchanan*. **Macquarrie Island**, *Fraser*, in Herb. Hook. Also found in *Fuegia* and the *Falkland Islands*.

3. ***A. microphylla*, Hook. f. Fl. N. Z. i. 55.** Small, tufted, procumbent, much branched, glabrous or nearly so. Leaves 1 in. long; leaflets 2-6 pairs, suborbicular, inciso-serrate or crenate,  $\frac{1}{3}$ – $\frac{1}{4}$  in. long. Scapes short, 1-3 in. long, leafless. Heads large for the size of the plant, globose. Calyx 4-angled, the angles thickened or produced into rigid, divaricating red spines, that are rarely hispid at the apex. Petals green, united at the base, nearly



glabrous. Stamens 1 or 2. Achenes usually two, bony, with subclavate, fimbriate stigmas.

**Northern** Island: Tongariro, *Bidwill*, *Colenso*. **Middle** Island: Ashburton range, alt. 2000 ft., *Sinclair*; Otago, Lake district, *Hector* and *Buchanan*.

4. **A. Buchanani**, *Hook. f., n. sp.* Habit and size of *A. microphylla*, but the young branches petioles and calyx are villous with silky hairs; flowers much fewer in a head, spines of the calyx curved, yellow, usually with a few bristles at the tip. Stigma elongate, dilated upwards, fimbriate. Stamen 1. Achenes bony.

**Middle** Island: Otago, lake district, *Hector* and *Buchanan*. Foliage very pale. As in *A. microphylla*, the fruiting calyx is sometimes not spinescent.

5. **A. inermis**, *Hook. f. Fl. N. Z. i. 54.* Small, prostrate, slightly silky, tufted, much-branched below. Leaves 1-4 in. long; leaflets 4-6 pairs, orbicular, very small,  $\frac{1}{8}$ - $\frac{1}{3}$  in. long, deeply crenate, rather coriaceous. Scapes leafless, or with a small bract or solitary leaf, 2-3 in. long, silky or glabrous. Heads  $\frac{1}{3}$  in. diam., globose. Calyx silky or pubescent, 4-angled, the angles thickened in fruit, not spinescent. Petals united at the base, green. Stamens 2; filaments short. Achenes 2; stigma dilated, fimbriate on one side.

**Middle** Island: mountainous districts, Nelson, *Bidwill*; Lake Rotuiti, etc., *Munro*; Kowai river and eastern hills, alt. 1500-3000 ft., *Haast*.

Several European *Rosaceæ* have been introduced into New Zealand, of which some, as the Briar-rose, are said to be naturalized.

*Alchemilla* (*Aphanes*) *arvensis*, Linn., a procumbent, much branched annual, with small cut leaves, and very minute green flowers, is sent by Mr. Travers, from Taradale plain, alt. 4000 ft.; though stated by Brown to be indigenous to Australia, I think there can be no doubt of its being introduced there, and into New Zealand also.

*Staphylorhodos* *Cotoneaster*, Turczaninow, in Bull. Soc. Imp. Mosc. 1862, ii. 321,—a plant referred to *Rosaceæ*, but if correctly, certainly a very anomalous member, is stated by its author to be a native of New Zealand, sent by Sir Everard Home, R.N., to R. Brown (n. 563 and 579), at the sale of some of whose collections it was purchased. There is, however, no such plant nor number in the original collection of Sir E. Home, preserved in the British Museum, nor any New Zealand plant at all agreeing with the characters of this.

## ORDER XXIV. SAXIFRAGEÆ.

Herbs, shrubs, or trees. Leaves opposite or alternate, simple or compound, stipulate or exstipulate. Flowers usually hermaphrodite and regular.—Calyx free or adnate to the ovary, lobes 4 or 5, valvate or imbricate. Petals 4 or 5, valvate or imbricate, usually small and coriaceous. Disk perigynous or epigynous. Stamens usually as many or twice as many as the petals, in *Donatia* fewer. Ovary 2-5-celled; styles 2-5, stigmas usually capitate; ovules numerous, on axile or rarely parietal placentas. Fruit generally a capsule with many seeds, almost a berry in *Carpodetus*, unknown in *Donatia*. Seeds usually small; albumen copious; embryo terete (large, with scanty albumen, in *Ixerba*).

A large Order, containing very many different forms, so that it is impossible to define it tersely. The immense herbaceous tribe of Saxifrages proper is represented by *Donatia* alone in New Zealand.

Tufted, alpine, moss-like herb, with terminal, sessile, white flowers . . .	1. DONATIA.
Shrubs or trees. Leaves alternate. Petals imbricate. Ovary inferior . . .	2. QUINTINIA.
Shrub or tree. Leaves alternate and opposite, exstipulate. Ovary superior . . .	3. IXERBA.
Shrub or tree. Leaves alternate. Petals valvate. Ovary inferior . . .	4. CARPODETUS.
Tree. Leaves opposite, pinnate. Calyx valvate. Ovary superior . . .	5. ACKAMA.
Trees or shrubs. Leaves opposite; leaflets 1-3 or pinnate. Calyx imbricate. Ovary superior . . .	6. WEINMANNIA.

## 1. DONATIA, Forst.

Densely tufted, moss-like, alpine herbs, with very numerous leaves, densely imbricating all round the branches. Flowers terminal, sessile, solitary, white. —Calyx-tube obconic, adnate with the ovary; lobes 4 or 5, equal or unequal. Petals 5-10, linear or ovate. Stamens 2 or 3, inserted on an epigynous disk; filaments cohering at their bases with the bases of the styles; anthers didymous, bursting outwardly. Ovary inferior, 2 or 3-celled; styles 2 or 3, subulate, recurved, stigmas simple or capitate; ovules numerous, on placentas which are pendulous from the top of the cells. Fruit unknown.

A genus of but two species, one Fuegian, the other a native of the summits of the Tasmanian and New Zealand mountains.

1. **D. novæ-Zelandiæ**, Hook. f. *Fl. N. Z.* i. 81. t. 20. Stems very short, including the leaves as thick as the little finger, densely clothed with leaves, of which the upper are bright green, the lower brown. Leaves erect, appressed,  $\frac{1}{3}$  in. long, coriaceous, linear-subulate, obtuse, villous at the base, nerveless, punctate. Calyx-lobes and petals 5, the latter thick, ovate-oblong, blunt,  $\frac{1}{10}$  in. long. Stamens 2, filaments short. Styles 2.

**Middle Island**: mountains near Port Preservation, *Lyall*.

## 2. QUINTINIA, A. DC.

Glabrous shrubs or trees. Leaves alternate, persistent, exstipulate. Flowers small, white, in axillary or terminal many-flowered racemes. —Calyx-tube obconic, adnate to the ovary; teeth 5, persistent. Petals 5, oblong, obtuse, deciduous, imbricate. Stamens 5; filaments short, subulate. Ovary inferior, 3-5-celled, its free conical top narrowed into a conical, persistent, furrowed style; stigma capitate, 3-5-lobed; ovules very numerous. Capsule small, inferior or half superior, coriaceous, obovoid, 3-5-ribbed, 1-celled, many-seeded, dehiscing at the tip between the styles. Seeds elongate, imbricating; testa winged.

A small Australian and New Zealand genus. The New Zealand species are covered with lepidote scales, beneath which a viscid exudation is secreted.

Leaves 3-6 in., remotely serrate . . . . .	1. <i>Q. serrata</i> .
Leaves 2 in., obscurely sinuate-serrate . . . . .	2. <i>Q. elliptica</i> .

1. **Q. serrata**, A. Cunn.; —*Fl. N. Z.* i. 78. A small, erect tree; branchlets, leaves, and racemes covered with lepidote scales. Young parts viscid. Leaves petioled, 3-6 in. long, narrow linear-lanceolate or -oblong, rather obtuse, remotely irregularly and obtusely serrate, margins undulate, when dry

coriaceous, yellow-brown above, red-brown below. Racemes shorter than the leaves. Flowers  $\frac{1}{4}$  in. diam. Capsules  $\frac{1}{8}$  in. long.—Hook. Ic. Pl. t. 558.

Var.  $\beta$ . Leaves broader, very viscid, oblong-lanceolate, 3 in. long, 1 broad.

**Northern** Island: not uncommon in forests. Var.  $\beta$ . **Middle** Island: Aorere valley, alt. 1400 ft., *Travers*.

2. **Q. elliptica**, *Hook. f. Fl. N. Z.* i. 78. Very similar to *Q. serrata*, but smaller. Leaves 2 in. long, on rather longer petioles, very obtuse, broader, and very obscurely sinuate-serrate.

**Northern** Island: east coast, *Colenso*. Probably a variety of *Q. serrata*.

### 3. **IXERBA**, A. Cunn.

A small, evergreen, glabrous shrub or tree. Leaves exstipulate, opposite alternate or whorled, glandular-serrated. Flowers large, white, paniced.—Calyx-tube adnate with the base of the ovary; lobes 5, deciduous, imbricate. Petals 5, inserted beneath a 5-lobed disk, obovate, acute, clawed, coriaceous, imbricate. Stamens 5; filaments filiform; anthers linear-oblong. Ovary superior, conical, 5-lobed, 5-celled, narrowed into a subulate, acute, 5-furrowed, twisted style, stigmas acute; ovules 2 in each cell, collaterally suspended. Capsule very coriaceous, shortly ovoid, 5-celled, dehiscing through the style loculicidally; valves cohering below, 2-partite above. Seeds oblong, compressed, with a thick funicle and shining clouded or black testa, large embryo, and little albumen.

1. **I. brexioides**, *A. Cunn.*;—*Fl. N. Z.* i. 82. A small tree, 20 ft. high. Leaves coriaceous, linear or linear-lanceolate, 4 in. long by  $\frac{1}{3}$  broad, but very variable. Flowers  $1\frac{1}{3}$ – $1\frac{3}{4}$  in. diam. Capsule  $\frac{3}{4}$  in. broad. Seed  $\frac{1}{5}$ – $\frac{1}{4}$  in. long.—Hook. Ic. Pl. t. 577–588.

**Northern** Island: in woods, from the Bay of Islands to Wellington, but not very common.

### 4. **CARPODETUS**, Forst.

A shrub or tree. Leaves alternate, exstipulate, evergreen. Flowers paniced.—Calyx-tube turbinate, connate with the ovary; lobes 5 or 6, short, deciduous. Petals 5 or 6, inserted under an epigynous disk, spreading, valvate. Stamens 5 or 6; filaments short, subulate; anthers oblong. Ovary inferior, with a swollen top, 3–5-celled; style slender, stigma capitate; ovules very numerous. Fruit almost fleshy, globose, indehiscent, girt at the middle by the calyx-limb, 3–5-celled, many-seeded. Seeds small, pendulous, ovoid; testa coriaceous, pitted; embryo minute, in the base of fleshy albumen.

1. **C. serratus**, *Forst.*;—*Fl. N. Z.* i. 78. A shrub or small tree, 10–30 ft. high; trunk usually slender; branches spreading in a fan-shaped manner; all parts more or less pilose. Leaves petioled, ovate-oblong, obtuse,  $1$ – $1\frac{1}{2}$  in., much smaller on young plants, rather membranous, acutely serrate. Panicle cymose, shorter than the leaves. Flowers  $\frac{1}{5}$  in. diam., white. Fruit size of a peppercorn.—Hook. Ic. Pl. t. 564.

**Northern** and **Middle** Islands: frequent by the banks of rivers, *Banks and Solander*, etc. Wood soft, tough, used for axe-handles, *Hector*.

5. **ACKAMA**, A. Cunn.

A small tree. Leaves opposite, pinnate, stipulate. Flowers small, panicled, unisexual.—Calyx inferior, 5-partite; lobes valvate. Petals 5, linear-spathulate, inserted beneath a 10-lobed disk, about as long as the calyx. Stamens 10; filaments filiform, the alternate longer; anthers didymous. Ovary free, hirsute, 2-celled; styles 2, filiform, persistent; ovules very numerous, on parietal placentas. Capsule small, coriaceous, turgid, 2-celled, septically 2-valved, valves gaping inwardly. Seeds turgid, ovoid, apiculate; testa smooth, lax, pilose; embryo cylindric, albumen scanty.

1. **A. rosæfolia**, A. Cunn.;—*Fl. N. Z.* i. 79. ii. 329. Tree 30–40 ft. high. Leaves pubescent, imparipinnate, 3–10 in. long. Leaflets in 3–6 pairs, subsessile, linear-oblong, acute, acutely serrate, 1–2 in. long, rather membranous, the upper larger; stipules deciduous, leafy, toothed. Flowers small,  $\frac{1}{2}$  in. diam., in spreading, branched panicles, sessile on the branchlets. Capsule very small.

Northern parts of the **Northern** Island. Woods at the Bay of Islands, not uncommon, A. Cunningham, etc. A. Gray (Bot. U. S. Expl. Exped. i. 672) regards this as a subgenus of *Weinmannia*, but I think erroneously.

6. **WEINMANNIA**, Linn.

Shrubs or trees. Leaves opposite, stipulate, 1–3-foliate or pinnate. Flowers racemose, small.—Calyx inferior, tube short; limb 4–5-partite, imbricate. Petals 4 or 5, inserted under the edges of a lobed disk, imbricate. Stamens 8 or 10; filaments filiform; anthers didymous. Ovary free, ovoid or conical, 2-celled, narrowed into two beaks; styles filiform; ovules few or many, placentas inserted above the middle in the axes of the cells. Capsule small, coriaceous, 2-celled, septically 2-valved, valves gaping inwardly. Seeds oblong reniform or subglobose; testa membranous, often pilose; embryo terete; albumen fleshy.

A large Indian, Pacific Island, Australian, and S. American genus.

Branchlets, peduncles, and petioles pubescent. Leaves 3-foliate or pinnate 1. *W. silvicola*.  
Branchlets, peduncles, and petioles glabrous. Leaves 1-foliate . . . 2. *W. racemosa*.

1. **W. silvicola**, Banks and Sol.;—*Fl. N. Z.* i. 79. A small tree, 20–30 ft. high, with dark bark, the young leaves, branchlets, inflorescence, and costa of leaf below all pubescent or glabrescent. Leaves opposite, 1–3-foliate or imparipinnate (on the same specimen), 1–3 in. long; leaflets variable, 1–2 in. long, obovate-oblong or lanceolate, acute or acuminate, coarsely serrate, coriaceous, punctate beneath, young ones membranous, glabrous or pubescent below, usually narrowed into the petiole; stipules leafy, oblong, entire or toothed. Racemes 2–4 in., slender, many-flowered. Flowers  $\frac{1}{10}$  in. diam., pedicelled, white. Capsule glabrous or minutely hairy,  $\frac{1}{5}$ – $\frac{1}{3}$  in. long.—*W. fuchsoides* and *W. betulina*, A. Cunn.

Abundant in woods throughout the **Northern** Island, and in the northern part of the **Middle** Island, Banks and Solander, etc. An exceedingly variable plant, of which I made three varieties in the New Zealand Flora, but find that these do not hold good: the most marked forms are a larger, often pinnated-leaved one, with almost tomentose branchlets,



petioles, and peduncle, and a much smaller, nearly glabrous one, with more coriaceous, usually 3-foliate leaves. The species is apparently identical with a New Caledonian one.

2. **W. racemosa**, Forst. ;—*Fl. N. Z.* i. 80. A larger leaved, more coriaceous plant than the preceding, glabrous, except the raceme; flowers large; leaves broader, 1-foliate. Leaflets 1–3 in., oblong-ovate or -lanceolate or orbicular-ovate, obtuse, sinuate-serrate, very coriaceous, punctate beneath. Racemes numerous, stout, erect, very many-flowered. Flowers  $\frac{1}{6}$  in. diam. Capsules  $\frac{1}{4}$  in. long, sometimes 3-valved.—*Leiospermum racemosum*, Don.

Middle and southern parts of the **Northern** Island, and throughout the **Middle** Island, *Banks and Solander*, etc. Very nearly allied to the preceding, and I once supposed a variety of it, but I now think them distinct.

## ORDER XXV. CRASSULACEÆ.

Succulent plants; the New Zealand species all very small, inconspicuous herbs. Leaves usually opposite, exstipulate.—Sepals 3 or more. Petals as many as the sepals. Stamens perigynous or almost hypogynous, as many as the petals or a multiple of them. Carpels as many as the sepals, free, each often with a scale at its outer base, 1-celled; style very short, or stigma sessile; ovules few or many, attached to the suture of the carpel. Seeds minute, albuminous; embryo terete.

A very large Order, to which *Sedum* and *Crassula* belong, especially abounding in South Africa and the southern parts of Europe.

### 1. TILLÆA, Micheli.

Small or minute, tufted, erect or procumbent herbs. Leaves small, opposite. Flowers axillary.—Sepals, petals, stamens, and carpels 3–5, the latter with or without scales at the base. Fruit of 3–5 follicles, with few or many seeds.

An inconsiderable genus, scattered over Europe and various parts of the world.

\* A scale at the base of each carpel.

Leaves $\frac{1}{6}$ – $\frac{1}{3}$ in.	Flowers $\frac{1}{6}$ – $\frac{1}{5}$ in. diam.	1. <i>T. moschata</i> .
Leaves $\frac{1}{12}$ – $\frac{1}{8}$ in.	Flowers $\frac{1}{10}$ in. diam.	2. <i>T. Sinclairii</i> .

\*\* No scales.

Stems erect.	Flowers very numerous.	Seeds 1 or 2 in each carpel	3. <i>T. verticillaris</i> .
Stems prostrate.	Flowers few.	Seeds 1 or 2 in each carpel	4. <i>T. debilis</i> .
Stems erect or prostrate.	Flowers few.	Seeds numerous	5. <i>T. purpurata</i> .

1. **T. moschata**, DC. ;—*Fl. N. Z.* i. 76. A tufted, rather succulent, red-brown herb, 3–5 in. high, sparingly branched, rooting at the axils of the leaves. Leaves small,  $\frac{1}{6}$ – $\frac{1}{3}$  in. long, oblong spatulate or obovate-oblong, obtuse, thick, quite entire. Flowers  $\frac{1}{6}$ – $\frac{1}{5}$  in. diam., white, axillary, shortly peduncled. Sepals 4, obtuse, half as long as the oblong obtuse petals. Stamens 4. Scales linear-cuneate. Carpels turgid, with short recurved styles, many-seeded.—Hook. Ic. Pl. t. 535 (scales omitted); *Crassula moschata*, Forst.

Moist rocks, etc., most frequent near the sea. East coast of the **Northern** Island, Co-

*lenso*. **Middle** Island more common, *Forst.*; Otago, *Lyall*, etc. **Lord Auckland's** group and **Campbell's** Island, abundant, *J. D. H.* Also a native of S. Chili, Fuegia, the Falkland Islands, and Kerguelen's Land. One of the largest species of the genus.

2. **T. Sinclairii**, *Hook. f., n. sp.* A small, delicate, tufted, pale-green plant, 1–2 in. high, with very slender stems. Leaves minute, oblong,  $\frac{1}{12}$  in. long. Flowers axillary, solitary, shortly pedicelled, white,  $\frac{1}{16}$  in. diam. Sepals 4, ovate-oblong, obtuse. Petals 4, twice as long as the sepals, obtuse. Scales and carpels as in *T. moschata*.

**Middle** Island: Rangitata river, alt. 2000 ft., *Sinclair* and *Haast*.

3. **T. verticillaris**, *DC.*;—*Fl. N. Z.* i. 75. A small, erect, pale red-brown, succulent herb; stems 2–4 in. long, simple or branched from the base. Leaves very small,  $\frac{1}{12}$ – $\frac{1}{8}$  in., linear- or ovate-oblong. Flowers very numerous, densely crowded in the axils of the leaves, very minute, some sessile, some on slender peduncles. Sepals 4, ovate-subulate. Petals subulate, smaller than the sepals. Scales 0. Carpels 1–2-seeded, lanceolate; styles rather slender.—*T. muscosa*, *Forst.*

Common on dry, rocky, sunny places, *Banks* and *Solander*, etc. Common in Australia and Tasmania, also found in Chili (*T. minima*, *Miers*). A. Gray mentions this as gathered at the Auckland Islands by Wilkes' Expedition, "except the tickets be misplaced."

4. **T. debilis**, *Col. in Fl. N. Z.* i. 75. A very small, delicate species; stems intricate, filiform or capillary, prostrate, 2–3 in. long. Leaves in scattered pairs, minute,  $\frac{1}{16}$ – $\frac{1}{12}$  in. long, ovate-oblong or linear-oblong. Flowers minute, 1 or 2 in the axils of the leaves, sessile or on slender peduncles. Sepals 4, oblong, subacute. Petals ovate-acuminate, shorter than the sepals. Scales 0. Carpels ovate-lanceolate, 1- or 2-seeded.

**Northern** Island: east coast, *Colenso*.

5. **T. purpurata**, *Hook. f. Fl. N. Z.* i. 75. A small, delicate, tufted, pale red-brown species, with slender, prostrate or erect stems, sparingly branched, 1–3 in. long. Leaves linear, acuminate,  $\frac{1}{8}$ – $\frac{1}{6}$  in. long. Flowers solitary, axillary, on capillary peduncles much longer than the leaves. Flowers  $\frac{1}{16}$  in. diam. Sepals 4, ovate, subacute. Petals smaller than the sepals, acuminate. Scales 0. Carpels broadly oblong, turgid, many-seeded.

**Northern** Island: east coast, Cape Palliser, etc., *Colenso*. Also a native of Tasmania and Southern Australia.

## ORDER XXVI. DROSERACEÆ.

All the New Zealand species but one are seapigerous herbs. Leaves covered on the upper surface or margins, or both, with copious glandular hairs. Flowers regular, hermaphrodite.—Calyx 4- or 5-partite, imbricate, persistent. Petals 4 or 5, hypogynous, rarely perigynous, generally persistent. Disk 0. Stamens 4 or 5, usually hypogynous, filaments subulate or filiform; anthers short, often bursting outwardly. Ovary superior, ovoid or globose, 1-celled; styles 3–5, filiform or clavate, simple bipartite or multifid; ovules numerous, on parietal placentas. Capsule membranous, 1-celled, loculicidally 3–5-valved, many-seeded. Seeds small; testa lax, reticulate; albumen fleshy, copious; embryo rather large or minute, cylindrical.

A remarkable but small Order, of which the prevalent characters alone are given above, and these apply to all the New Zealand species; a few northern and Cape genera present some remarkable exceptions, as shrubby habit, petals connate at the base, epipetalous stamens, 3-celled few-ovuled ovary, and minute embryo.

### 1. DROSERA, Linn.

Stamens 4-8. Styles 2 or 3, bipartite or multifid.

An extensive genus (Sundew) found in all parts of the world, but most abundant in Australia.

Scape 1-flowered. Calyx campanulate, 5-lobed. Styles 3, multifid . . .	1. <i>D. stenopetala</i> .
Scape 1-flowered. Leaves linear. Styles 3 or 4, stigmas capitate . . .	2. <i>D. Arcturi</i> .
Scape 1-flowered. Leaves orbicular. Styles 4, stigmas subclavate . . .	3. <i>D. pygmæa</i> .
Scape many-flowered. Leaves spathulate. Styles 3, bipartite . . .	4. <i>D. spathulata</i> .
Scape many-flowered. Leaves bipartite . . . . .	5. <i>D. binata</i> .
Scape many-flowered. Leaves lunate. Styles 3, pucicillate . . . . .	6. <i>D. auriculata</i> .

1. **D. stenopetala**, Hook. f. *Fl. N. Z.* i. 19. t. ix. Stemless. Leaves with the slender glabrous petiole 1-4 in. long; blade spathulate,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, densely clothed with long, glandular hairs. Scape slender, longer than the leaves, 1-flowered. Flowers  $\frac{1}{3}$  in. diam. Calyx campanulate, 5-lobed, glabrous. Petals very narrow, linear-spathulate. Styles 3, multifid to the base.

**Middle Island**: Port Preservation, *Lyall*. **Lord Auckland's group**, *J. D. H., Bolton*. Very nearly indeed allied to the Fuegian *D. uniflora*.

2. **D. Arcturi**, Hook.  *Ic. Pl. t.* 56;—*Fl. N. Z.* i. 20. Stemless; rhizome long, slender. Leaves 2-3 in. long, linear-ligulate or linear-spathulate, covered with long glandular hairs; petiole almost as broad as the blade. Scape about as long as the leaves, 1-flowered. Flowers nearly  $\frac{1}{2}$  in. diam. Petals obovate, as long as the calyx. Styles 3 or 4, short; stigmas capitate.

**Northern Island**: Ruahine mountains, near the snow, *Colenso*. **Middle Island**: common in wet places on the mountains, alt. 3500-5000 ft. Also a native of the Tasmanian and the Australian alps.

3. **D. pygmæa**, DC.;—*Fl. N. Z.* i. 20. A very small, stemless species. Leaves densely crowded, rosulate, shortly petioled, orbicular, concave, subpeltate,  $\frac{1}{8}$  in. diam.; stipules very large, scarious, forming a beautiful silvery star round the base of the scape. Scape filiform, 1 in. high. Flower solitary, minute. Sepals 4, oblong, obtuse, glabrous, shorter than the white petals. Styles 4, filiform, subclavate.

**Northern Island**: in marshes at Cape Maria Van Diemen, *Colenso*. Also a native of the south coast of Australia and Tasmania.

4. **D. spathulata**, *Labill.*;—*Fl. N. Z.* i. 20. Stemless. Leaves rosulate, densely crowded,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, spathulate, covered with glandular hairs. Scapes 1 or several, slender, simple or bifid, 8-15- (rarely 1-2-) flowered. Flowers shortly pedicelled, secund,  $\frac{1}{3}$  in. broad. Sepals united at the base. Petals spathulate, pink red or white, twice as long as the calyx. Styles 3, 2-partite.—*Bot. Mag. t.* 5240; *D. propinqua*, A. Cunn.

Wet places throughout the islands, but not very common, *Banks and Solander*, etc.; ascending to 5000 ft. on the shingly banks of Lake Wanaka and Hawea, *Haast*. A common Australian plant, also found in the Philippine Islands.

5. **D. binata**, *Labill.*;—*Fl. N. Z.* i. 20. Stemless. Leaves on slender petioles 2–4 in. long; blade divided into two linear, strap-shaped, simple or 2-fid, divaricating lobes 2–4 in. long, covered with glandular hairs. Scapes 8–12 in. high, very slender, glabrous, bearing a branched, 6–8-flowered cyme. Flowers white,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., on slender pedicels. Petals membranous, obcordate, twice as long as the glabrous or ciliate sepals. Styles 3, penicillate. —*Bot. Mag.* t. 3082; *D. intermedia*, A. Cunn.; *D. Cunninghamii*, Walpers.

Common in clay bogs, etc., throughout the islands, *Banks and Solander*, etc. Abundant in Tasmania and Australia. A very handsome plant.

6. **D. auriculata**, *Backhouse*;—*Fl. N. Z.* i. 21. Stem erect, simple or sparingly branched, 6–18 in. high, flexuose, glabrous, leafy, arising from a small coated tuber. Leaves peltate, lowest rosulate, orbicular,  $\frac{1}{4}$  in. diam., on short flattened petioles; upper alternate, rather larger, lunate, on filiform petioles  $\frac{1}{2}$ –1 in. long; all copiously studded towards the margin with very long glandular hairs. Flowers 3–8, on slender pedicels, white or lilac,  $\frac{1}{4}$ – $\frac{1}{3}$  in. diam. Sepals oblong, obtuse, often jagged. Petals three times longer than the sepals, obovate or obcordate. Styles 3, penicillate below the middle.

**Northern and Middle Islands**: not uncommon, often climbing by its glandular leaves amongst grass, *Banks and Solander*, etc. A common Australian and Tasmanian plant; also found in Norfolk Island.

## ORDER XXVII. HALORAGÆ.

Herbaceous, terrestrial or aquatic plants. Leaves opposite alternate or whorled, exstipulate. Flowers small, often very inconspicuous, variously arranged, hermaphrodite or unisexual, usually regular.—Calyx-tube adnate with the ovary; limb 0 or 2–4-lobed or -toothed. Stamens 2–4 (rarely 1), epigynous. Ovary inferior, usually 4-(rarely 1)-celled, with 2–4 (rarely 1) short conical styles, or as many sessile, plumose or papillose stigmas, or with 1–4 long subulate stigmatiferous styles; ovules solitary, pendulous in each cell. Fruit small, indehiscent, 4-celled and -seeded, or breaking up into 2–4 carpels, or a 1-celled small drupe. Seeds pendulous; testa membranous; albumen fleshy; embryo minute, ovoid, or long and terete.

A small Order of dissimilar plants, scattered over the world. The genus *Callitriche*, included here, is a very doubtful member. *Balanophorea*, an Order closely allied to *Haloragæa*, will be found amongst *Incompleteæ*.

Terrestrial. Calyx-lobes 4, evident. Fruit 4–8-gonous . . . . .	1. HALORAGIS.
Aquatic. Calyx-lobes 0 or inconspicuous. Fruit 4-lobed. Stigmas 4, very short . . . . .	2. MYRIOPHYLLUM.
Marsh. Calyx-lobes 2 or 3. Petals 2 or 0. Fruit drupaceous, 1-celled	3. GUNNERA.
Marsh and aquatic. Calyx-lobes 0. Fruit 4-lobed. Styles 2, very long . . . . .	4. CALLITRICHE.

### 1. HALORAGIS, Forst.

Erect procumbent or creeping, herbaceous plants. Leaves opposite or rarely alternate, toothed, rarely lobed or pinnatifid. Flowers axillary, minute, hermaphrodite or unisexual, sometimes racemose at the ends of the branches,



pendulous.—Calyx-tube terete, 4–8-angled or winged; lobes 4, erect, acute, persistent, valvate. Petals 4, small, concave, deciduous, coriaceous. Stamens 4 or 8, usually with short filaments and large linear or oblong anthers, bursting laterally. Ovary 2 or 4-celled; stigmas 2 or 4, sessile, plumose or simple. Fruit a dry, coriaceous or somewhat drupaceous, 4–8-angled or -winged, 2- or 4-celled nut. Seeds pendulous; embryo terete.

A genus almost confined to the south temperate zone, most frequent in Australia, found also in subtropical India, China, and Japan. One New Zealand species is also found in Juan Fernandez.

Glabrous. Leaves  $\frac{1}{2}$ – $1\frac{1}{2}$  in. Fruit with 4 narrow wings . . . . . 1. *H. alata*.  
 Scabrid. Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. Flowers axillary. Fruit 8-costate, muricate. 2. *H. tetragyna*.  
 Slightly scabrid. Leaves  $\frac{1}{4}$ – $\frac{1}{3}$  in. Flowers axillary. Fruit 4–8-costate 3. *H. depressa*.  
 Very slender, quite glabrous. Leaves  $\frac{1}{4}$ – $\frac{1}{3}$  in. Flowers in naked racemes.  
 Fruit 8-costate . . . . . 4. *H. micrantha*.

1. ***H. alata*, Jacq.**;—*Fl. N. Z.* i. 63. Stem herbaceous, erect or procumbent at the base, branched, 4-angled, 1–3 ft. high; branches suberect, slightly scabrid. Leaves opposite, sessile or petioled, ovate-lanceolate, acute or obtuse, very coarsely deeply serrate, coriaceous, slightly rough to the touch,  $\frac{1}{2}$ – $1\frac{1}{2}$  long. Flowers minute, green, in leafy slender terminal racemes, solitary or whorled, on short curved pedicels, drooping,  $\frac{1}{12}$  in. long. Calyx 4-angled, with 4 small lobes. Petals twice as long as the calyx-lobes. Nut small, with 4 narrow wings, green; sides smooth or wrinkled. Stigmas conical, not plumose.—*Cercodia erecta*, Murr.; *C. alternifolia*, A. Cunn.

Abundant on dry hills in various localities throughout the islands, *Banks and Solander*, etc.; ascending to 2000 ft. Also found in Juan Fernandez.

2. ***H. tetragyna*, Labill.**;—*Fl. N. Z.* i. 62. A suberect or prostrate, slender, branched herb, everywhere scabrid with short, hispid pubescence; branches slender, 2–8 in. long. Leaves all opposite, shortly petioled  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, ovate or lanceolate, acute, sharply serrate, rigidly coriaceous, scabrid on both surfaces. Flowers minute, sessile, solitary in the axils of the upper leaves. Nut ovoid,  $\frac{1}{12}$  in. long, 8-angled, muricate. Stigmas plumose.—*Goniocarpus tetragyna*, Labill. *Fl. Nov. Holl.* i. t. 53; *Cercodia incana*, A. Cunn.

Var. *a*. Branches suberect. Leaves  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, many-toothed.

Var. *B. diffusa*. Branches diffuse, prostrate. Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, broader, obtuser, with fewer teeth.

**Northern Island**: on dry hills; *a*, Bay of Islands; *B*, common there and at Auckland. I have seen no Middle Island specimens. Var. *a* is a native of Tasmania and Southern Australia, also of China (*G. scaber*, Kœnig), Borneo, and the mountains of East Bengal.

3. ***H. depressa*, Hook. f.** *Fl. N. Z.* i. 63. A very slender, prostrate, branched herb, slightly scabrid with short white hairs; branches 1–12 in. long, wiry, almost filiform. Leaves sessile, broadly ovate, subacute,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, with 3–5 deep close serratures on each side, slightly scabrid on both surfaces, coriaceous. Flowers solitary, axillary or subterminal, sessile. Nut  $\frac{1}{8}$  in. long, 4-angled, or obscurely 4–8-costate, smooth or wrinkled, but not muricate. Stigmas plumose.—*Goniocarpus depressus*, A. Cunn.

Common on dry hills, throughout the islands. Readily distinguished from *G. tetragyna* by being almost glabrous and very slender. In the New Zealand Flora I considered this as the same with the Tasmanian *H. (Goniocarpus) serpyllifolius*, Hook. *l.c.* Pl. t. 290, and it

is certainly most closely allied to it; but the fruit is very much larger in the New Zealand plant.

4. **H. micrantha**, Br.;—*H. tenella*, Brongn.; Fl. N. Z. i. 63. Small, slender, tufted, perfectly glabrous; stems and branches filiform, ascending or erect, 2–6 in. high, running out into leafless racemes. Leaves few,  $\frac{1}{6}$ – $\frac{1}{3}$  in. long, all opposite, subsessile, broadly ovate, subacute, with very few shallow crenatures on each side, glabrous. Flowers few, very minute, scattered along the naked filiform tips of the branches; pedicels very short. Nut minute, oblong, 8-ribbed. Stigmas plumose.—*Goniocarpus citriodorus*, A. Cunn.—*G. tenellus*, Brongn.

Common in rather moist and dry places in various parts of the **Northern** Island. **Middle** Island: Aglionby plains, *Munro*. Common in Tasmania, Southern Australia, the Eastern Himalaya, hilly parts of East Bengal, and in Japan. This is the *Goniocarpus citriodorus* of A. Cunningham, but I have never perceived any smell of lemons; possibly he dried it with *Micromeria*.

## 2. MYRIOPHYLLUM, Vaillant.

Water or marsh plants, with slender, terete, sparingly branched stems. Leaves usually whorled, entire toothed or pinnatifid, the submerged often capillaceo-multifid, the uppermost more entire, often opposite or alternate. Flowers small, in the axils of the upper leaves, almost sessile, uni- or bisexual. —Calyx-tube in the male 0, in the female ovoid or 4-gonous, limb 4-toothed or truncate. Petals 0 in the female flower, in the male 4, membranous, deciduous. Stamens 4 or 8, filaments short; anthers linear. Ovary 4-celled; styles 4, very short, or 0; stigmas often plumose. Fruit usually separating into 4 small, hard, indehiscent, 1-seeded nuts; testa membranous; albumen fleshy; embryo terete.

A very widely-diffused genus in both tropical and temperate regions. The species have wide ranges in their several zones, but those of the southern regions are hardly the same with the northern. The foliage is very variable; the upper leaves in the two first New Zealand species are sometimes as much divided as the lower.

Upper leaves whorled, short and broad, serrate . . . . .	1. <i>M. elatinoides</i> .
Upper leaves whorled, narrow-linear, nearly entire . . . . .	2. <i>M. variæfolium</i> .
All the leaves pectinate-pinnatifid. Fruit large . . . . .	3. <i>M. robustum</i> .
All the leaves opposite, linear, narrow, entire . . . . .	4. <i>M. pedunculatum</i> .

1. **M. elatinoides**, Gaudichaud;—Fl. N. Z. i. 63. Stems 6 in.–3 ft. long, depending on the depth of the water. Leaves whorled, usually 4-nate, the lower pectinately pinnatifid, 1–2 in. long, the upper much smaller, sessile, oblong, obtuse, serrate. Flowers small, white; female with two linear entire or serrate bracts. Stigmas plumose. Fruit of 4 minute, oblong, terete, smooth nuts.—*M. propinquum*, A. Cunn.

Still waters throughout the islands, ascending to 3000 ft. Abundant in Tasmania, Australia, and the lakes of the Cordillera from the equator to Chili and the Falkland Islands.

2. **M. variæfolium**, Hook. f. in Ic. Pl. t. 289;—Fl. N. Z. i. 65. Habit of the last, but leaves in whorls of 5–7, the lower multifid or pectinate-pinnatifid, the upper very narrow linear,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, quite entire or serrate. Flowers and fruit very small, like those of *M. elatinoides*, but the bracts are much shorter than the nuts.

Common in still water throughout the islands, as far south as Canterbury. Also found in Tasmania, Australia, and South America.

3. **M. robustum**, *Hook. f., n. sp.*;—*M. varicifolium*,  $\beta$ , Fl. N. Z. i. 64. Stems robust. Leaves 1–2 in. long, 5–7 in a whorl, all pectinately-pinnatifid. Flowers and nuts much larger than in the preceding species, the latter nearly  $\frac{1}{2}$  in. long, tumid, short, rounded at the back, smooth or obscurely tubercled, bracts very short.

**Northern Island**, *Colenso*. A robust species, of which I have imperfect specimens, full of fruit, which is as large as in the Indian *M. tuberculatum*, but the nuts are more rounded, and the foliage is coarse and more crowded. It much resembles some states of the European *M. verticillatum*. I do not recognize it amongst the Australian and American species.

4. **M. pedunculatum**, *Hook. f. Fl. Tasm.* i. 123. t. 23 B. Small, tufted, erect, slender, simple or sparingly branched, 2–4 in. high. Leaves opposite, narrow linear, quite entire or obscurely toothed,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Flowers minute, sessile or shortly pedicelled. Stamens 8. Styles recurved; stigmas plumose. Nuts ovoid, somewhat wrinkled.

**Middle Island**: moist places, Canterbury plains, *Sinclair and Haast*. Found also in Tasmania and Victoria, where the leaves sometimes become broad and flat.

### 3. GUNNERA, Linn.

Stemless herbs, usually growing in swamps or boggy places, with stout or slender creeping or subterranean rhizomes. Leaves petioled, radical. Scapes bearing small, racemose or panicle, unisexual, rarely bisexual, flowers.—Male fl.: Sepals 2 or 3. Petals 2 or 3 or 0. Stamens 2 or 3, opposite the petals, filaments slender; anthers large, often tetragonous. Female fl.: Calyx-tube ovoid, lobes 2 or 3, often toothed. Petals 2 or 3 or 0. Stamens 0. Ovary 1-celled; styles usually 2, linear subulate or filiform, covered with stigmatic papillæ; ovule solitary, pendulous. Fruit a small, rather fleshy drupe. Seed filling the cavity of the drupe, to the walls of which the membranous testa often adheres; albumen fleshy and oily; embryo very minute, broadly pyriform or cordate.

An almost exclusively southern genus, scattered over the Australian, Malayan, New Zealand, Pacific, and South American islands, also found in South Africa and in the Andes, as far north as the Gulf of Mexico. The Chilean species is noted for its immense leaves, sometimes 6 ft. across. The New Zealand species have long filiform styles, and no petals.

Leaves orbicular-reniform. Flowers lax, subpanicled. Drupe very

small, ovoid . . . . . 1. *G. monoica*.

Leaves reniform or cordate. Flowers in a dense spike. Drupe oblong. 2. *G. densiflora*.

Leaves oblong- or ovate-oblong. Flowers spicate. Drupe much larger, obovoid . . . . . 3. *G. prorepens*.

1. **G. monoica**, *Raoul, Choix* xv. t. 8;—*Fl. N. Z.* i. 65. Glabrous or minutely hairy; rhizome creeping, tufted, forming matted patches. Leaves reniform or orbicular,  $\frac{1}{2}$ – $\frac{2}{3}$  in. diam., lobed and crenate, or crenate only, both surfaces glabrous or covered with scattered small hairs, petiole  $\frac{1}{2}$ –2 in. long, pilose, rarely glabrous. Panicle longer or shorter than the leaves, very slender, branched, rarely simple. Flowers sparse, males with long filaments; bracts

and calyx-lobes ciliate, rarely entire. Drupes very small, ovoid, about  $\frac{1}{12}$  in. long.

Moist shady places throughout the islands, *Banks and Solander*, etc.

2. **G. densiflora**, *Hook. f., n. sp.* Rhizome creeping, tufted. Leaves orbicular cordate or broadly ovate-cordate, glabrous, minutely toothed,  $\frac{1}{2}$ –1 in. diam.; petioles 1–1 $\frac{1}{2}$  in., villous or glabrescent. Spike on a stout, erect, villous or glabrescent peduncle. Flowers crowded, males with short filaments; bracts and calyx-teeth small, subulate. Drupes crowded, small, pendulous,  $\frac{1}{10}$  in. long, oblong.

**Middle Island**: Acherou and Clarence rivers, alt. 4000 ft., *Travers*. Similar to *G. monoica*, but the leaves are never lobed, though minutely and sharply toothed, the peduncles stout, flowers spiked, crowded, filaments short, and drupes larger, oblong, and pendulous.

3. **G. prorepens**, *Hook. f. Fl. N. Z. i. 66.* Usually much larger than the two preceding species, often 1 ft. high, but sometimes small. Leaves ovate or oblong, rounded at the top, rounded or cordate at the base, crenulate,  $\frac{1}{2}$ –2 in. long; petiole 1–8 in. long, glabrous or more or less hairy. Peduncle stout, as long as the petiole. Flowers spicate. Drupes sessile, large,  $\frac{1}{8}$ – $\frac{1}{6}$  in. long, obovoid.

Var. ?  $\beta$ . Smaller, leaves ovate-oblong, narrowed into the petiole, deeply toothed; probably a distinct species.

**Northern Island**: in subalpine wet localities, *Colenso*. **Middle Island**: west coast, *Lyall*. Var. ?  $\beta$ . **Northern Island**, *Colenso*. **Middle Island**: mountains of Nelson, *Rough*; Clarence valley, 3000 ft., *Travers*; alps of Canterbury, *Haast*; and of Otago, *Hector and Buchanan*.

I have what appears to be a fourth species of *Gunnera*, from the base of Tongariro, *Colenso*, etc.; and the Middle Island, *Lyall*; with the leaves of *G. densiflora*, and fruit of *G. monoica*, but too imperfect for description.

#### 4. **CALLITRICHE**, Linn.

Small, branched, glabrous, delicate aquatic or marsh plants. Leaves opposite, linear or spatulate, membranous, quite entire.—Flowers minute, solitary, rarely 2 together, axillary, sessile, or very shortly peduncled. Male fl.: Bracts 0 or 2, deciduous, narrow-oblong, membranous, curved. Perianth 0. Stamen 1; filament capillary; anther 2-celled, bursting by lateral slits, which becoming confluent above, assume a horse-shoe form. Female fl.: Bracts as in the male or 0. Perianth (if any) adherent to the ovary, which consists of 4 laterally compressed 1-celled carpels; styles 2, filiform, papillose all over; ovule 1 in each cell, pendulous. Fruit 4 minute, flattened, keeled or winged carpels. Seed oblong or cylindric; testa membranous; albumen fleshy; embryo small, terete.

A small genus of doubtful affinity, found in all parts of the temperate world.

1. **C. verna**, *Linn.*;—*Fl. N. Z. i. 64.* Stems 5–10 in. long in water, shorter when growing on damp soil. Leaves  $\frac{1}{6}$ – $\frac{2}{3}$  in. long, obtuse, 3-nerved, orbicular spatulate or linear-obovate. Male and female flowers sometimes collateral on the same pedicel. Carpels narrowly winged at the back.

Common in wet soil and watery places throughout the islands, *Banks and Solander*, etc. **Lord Auckland's** group, and **Campbell's** Island, *J. D. H.* Abundant in the antarctic and northern and southern temperate regions.



## ORDER XXVIII. MYRTACEÆ.

Shrubs or trees, sometimes subscandent. Leaves opposite or alternate, exstipulate, quite entire, furnished with pellucid glands full of volatile fragrant oil. Flowers hermaphrodite, regular, solitary or in axillary or terminal racemes or cymose panicles, often showy.—Calyx-tube adnate with the ovary, ovoid oblong or obconic, sometimes produced beyond the ovary, limb 4- or 5-cleft, deciduous or persistent. Petals 4 or 5, orbicular, concave, sessile, imbricate. Stamens very numerous in the New Zealand genera, filaments short or long, incurved in bud; anthers small, didymous. Ovary inferior, usually 4-5-celled; style slender or short, simple, stigma simple or capitate; ovules numerous, on projecting placentas. Fruit dry or succulent, indehiscent or capsular, 1- or more celled, 1- or more seeded. Seeds very various, exalbuminous; embryo straight or curved.

A very large Order, especially in the tropics, rare in the north temperate zone, represented in Europe by the Myrtle alone, but common in the south temperate zone, where one species advances to Cape Horn, and another to Campbell's Island.

Leaves alternate. Flowers solitary or fascicled . . . . . 1. LEPTOSPERMUM.  
Leaves opposite.

Flowers cymose or racemed. Capsule many-seeded. Seeds linear . . . 2. METROSIDEROS.

Flowers usually solitary. Berry many- or few-seeded. Seeds with  
bony testa. . . . . 3. MYRTUS.

Flowers cymose. Berry 1- or few-seeded. Seeds large, angular . . . 4. EUGENIA.

## 1. LEPTOSPERMUM, Forst.

Shrubs or trees. Leaves alternate, small, evergreen, coriaceous. Flowers solitary or fascicled, shortly peduncled, white or pink.—Calyx-tube turbinate, lobes 5, often persistent, valvate. Petals 5, rounded, concave. Stamens numerous, filaments short. Ovary 4- or 5-celled; style straight; ovules very numerous. Capsule coriaceous or woody, broadly hemispherical, bursting within the calyx-border by 4 or 5 valves. Seeds very numerous, small, linear, pendulous from the inner upper angle of the cell; testa membranous.

A very large subtropical and temperate Australian genus, extending northwards to the Malayan islands.

Leaves pungent. Flowers solitary, sessile. Calyx-lobes deciduous . . . 1. *L. scoparium*.

Leaves not pungent. Flowers fascicled, peduncled. Calyx-lobes persistent . . . . . 2. *L. ericoides*.

1. *L. scoparium*, Forst.;—*Fl. N. Z.* i. 70. A large bush or small tree; trunk erect; branches fastigiate, prostrate in alpine localities; young branches and leaves silky. Leaves very variable,  $\frac{1}{6}$ — $\frac{3}{4}$  in. long, sessile, from linear-lanceolate to orbicular, acuminate, rigid, pungent, concave, veinless, dotted, patent or recurved. Flowers sessile, solitary, axillary or terminal,  $\frac{1}{4}$ — $\frac{3}{4}$  in. diam. Calyx-tube broadly turbinate, lobes orbicular, deciduous. Petals orbicular, clawed, crumpled. Capsule woody, turbinate, half sunk in the calyx-tube; the free portion 5-valved.

Var. *α*. *Fl. N. Z.* i. c. Erect, leaves lanceolate.

Var. *β*. *linifolium*, l. c. Erect, leaves narrow, linear-lanceolate.

Var. *γ*. *myrtifolium*, l. c. Erect, leaves ovate, spreading or recurved.

Var. *δ. prostratum*, l.c. Prostrate, branches ascending. Leaves ovate or orbicular, recurved.

Abundant throughout the islands, *Banks and Solander*, etc. Wood hard. Leaves used as tea in Tasmania and Australia, where the plant is equally abundant and variable.

2. ***L. ericoides***, *A. Rich.*;—*Fl. N. Z.* i. 70. A large, erect shrub or tree, 10–40 ft. high, similar to the *L. scoparium*, but with more slender, glabrous branches; narrower, less coriaceous, acute, not pungent leaves, which are fascicled and erect or recurved; pedicelled, smaller flowers, and the smaller capsule immersed in the calyx-tube.

Abundant throughout the islands, *Banks and Solander*, etc.

## 2. METROSIDEROS, Br.

Erect or subsucculent trees or large shrubs, often embracing the trunks of forest trees and strangling them. Leaves opposite, sometimes distichous, coriaceous. Flowers in terminal or axillary racemes or cymes, white pink or scarlet.—Calyx-tube globose oblong or turbinate, sometimes produced into a tubular or campanulate limb, lobes 5, concave, imbricate. Petals 5. Stamens very numerous; filaments filiform. Ovary 3-celled; style slender; ovules very numerous, linear, radiating outwards from tumid axile placentas. Capsule coriaceous, sunk deeply in the calyx, or its tip free, 3-celled, 3-valved, bursting usually loculicidally, rarely irregularly. Seeds very numerous, densely packed, linear; testa membranous.

A comparatively small genus, consisting of several Pacific Island species, 10 New Zealand, an Indian, and a South African one. Its total absence in Australia is a most remarkable fact.

*Capsule coriaceous or woody, wholly enclosed in the calyx-tube, which is produced beyond it, not dehiscent to the base; bursting irregularly, or by 3 valves within the calyx.*

Scandent. Leaves obtuse. Calyx glabrous . . . . . 1. *M. florida*.

Erect. Leaves acuminate. Calyx silky . . . . . 2. *M. lucida*.

*Capsule rather membranous, wholly enclosed in the calyx-tube, which is produced far beyond it, dehiscent to the base.*

Leaves decussate, very acuminate. Petals white . . . . . 3. *M. albiflora*.

Leaves decussate,  $\frac{3}{4}$ –1 $\frac{1}{4}$  in., oblong, obtuse. Petals scarlet . . . . . 4. *M. diffusa*.

Leaves distichous,  $\frac{1}{3}$ – $\frac{2}{3}$  in., oblong-ovate, subacute. Branches glabrescent . . . . . 5. *M. hypericifolia*.

Leaves distichous, ovate-lanceolate, acuminate. Branches tomentose . . . . . 6. *M. Colensoi*.

*Capsule girt below the middle by the calyx-tube, the upper half exposed, 3-valved.*

Erect. Leaves 1–1 $\frac{1}{2}$  in., decussate, glabrous, obtuse . . . . . 7. *M. robusta*.

Erect. Leaves 1–3 in., decussate, downy below . . . . . 8. *M. tomentosa*.

Erect. Leaves  $\frac{3}{4}$ –1 $\frac{1}{4}$  in., decussate, obovate, downy below . . . . . 9. *M. polymorpha*.

Scandent. Leaves  $\frac{1}{2}$ – $\frac{3}{4}$  in., distichous, glabrous, 3-nerved . . . . . 10. *M. scandens*.

1. ***M. florida***, *Sm.*;—*Fl. N. Z.* i. 67. *t.* 15. A lofty climber, often clothing the tall forest-trees. Trunk very stout; branches and branchlets terete, glabrous or puberulous. Leaves 1–3 in., on short petioles, elliptic-oblong, obtuse, coriaceous, glabrous; midrib stout; nerves numerous, slender, parallel, nearly horizontal. Flowers with the stamens 1 in. long, collected into terminal, branching, few- or many-flowered cymes; peduncles and pedicels short and thick. Calyx obconic or turbinate, costate, glabrous, produced beyond the ovary into an obconic cup. Petals orbicular, pale pink. Stamens scarlet, numerous, and style stout. Ovary wholly adnate with the base of the

calyx-tube. Capsule thick, almost woody, urceolate, with 5 stout ribs, the lobes finally deciduous.—*Melaleuca florida*, Forst. Prod.; *Leptospermum scandens*, Forst. Gen.

Common in forests throughout the islands, *Banks and Solander*, etc. **Lord Auckland's** group, *Bolton*.

2. **M. lucida**, *Menzies*;—*Fl. N. Z.* i. 67. A small, erect, branching evergreen tree; bark pale, papery; branches obscurely tetragonous; twigs and very young leaves silky. Leaves 1–3½ in. long, elliptic-lanceolate, acuminate at both ends, shortly petioled, very coriaceous, shining above, quite glabrous, midrib stout, lateral nerves faint, oblique; under surface with large glands. Flowers 3 or more together, sessile or shortly pedicelled at the ends of the branches. Calyx broadly obovate, ⅓ in. long; tube silky; lobes ovate, obtuse, persistent. Petals small, oblong or linear, scarlet. Stamens scarlet, very numerous and style very stout, nearly 1 in. long. Ovary free above the middle. Capsule broadly urceolate with 5 stout ribs, the upper free 3-valved part enclosed in the coriaceous calyx-limb.—*M. umbellata*, Cavanilles; *Melaleuca lucida*, Forst.; *Agalmanthus umbellatus*, Homb. and Jacq.

Mountainous districts of the **Northern** Island, *Colenso*. Abundant in the **Middle** Island, and forming the greater part of the wood on **Lord Auckland's** group.

3. **M. albiflora**, *Banks and Sol.*;—*Fl. N. Z.* i. 67. A lofty climber; trunk stout; branches perfectly glabrous; branchlets terete. Leaves decussate, 1½–3 in. long, elliptic-lanceolate, acuminate at both ends, shining above, very coriaceous, shortly petioled; margins recurved when dry; midrib stout, lateral veins numerous, delicate, leaving the costa at an acute angle. Flowers in terminal, leafless, many-flowered, branched, glabrous cymes; peduncles and pedicels rather slender. Calyx scarcely ¼ in. long, campanulate; lobes shortly ovate, obtuse, persistent. Petals small, white, orbicular. Stamens and style very slender. Ovary wholly adnate to the base of the calyx-tube. Capsule ½ in. long, urceolate, turgid, 3-lobed, bursting loculicidally, crowned by the much narrower tubular calyx, which is terminated by the reflexed persistent lobes.—Hook. Ic. Pl. t. 569; *M. diffusa*, A. Cunn., not Smith.

**Northern** Island: dense forests in the Bay of Islands, and east coast, *Banks and Solander*, etc.

4. **M. diffusa**, *Smith*;—*Fl. N. Z.* i. 67. A large, scandent, glabrous shrub, with pale, ragged bark, and slender, obscurely 4-gonous branches. Leaves somewhat distichous, ¾–1¼ in., shortly petioled, elliptic-oblong, obtuse; midrib and oblique lateral veins prominent. Flowers in terminal and lateral many-flowered, puberulous, often leafy cymes. Calyx ⅓ in. long, narrow-oblong, suddenly expanding into a cup-shaped limb, with orbicular deciduous lobes. Petals orbicular, scarlet, shortly clawed, jagged. Stamens and style ¾ in. long, slender. Ovary wholly adherent to the lower part of the calyx-tube. Fruit shortly pyriform, turgid, 5-ribbed, rather membranous, bursting loculicidally, crowned with the short calyx-limb.—*M. myrtifolia*, Gærtner; *M. lucida*, Linn. f.; *M. Homeana*, Turczaninow.

**Northern** Island: frequent in forests, *Banks and Solander*, etc.

5. **M. hypericifolia**, A. Cunn.;—*Fl. N. Z.* i. 67. t. 16. A large, rambling, climbing shrub, with ragged bark, and slender, divaricating, 4-angled

branches, glabrous or minutely pubescent. Leaves distichous, sessile,  $\frac{1}{3}$ – $\frac{2}{3}$  in., ovate-oblong or oblong-lanceolate, acute or apiculate, glabrous on both surfaces, rather membranous; midrib and lateral nerves delicate. Flowers small, with the stamens  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, in short, lateral, few-flowered, glabrous or pubescent racemes; peduncles and pedicels slender. Calyx-tube pyriform, suddenly dilating into a short campanulate or cup-shaped spreading limb; lobes triangular-ovate. Petals orbicular, scarlet, shortly clawed. Stamens and style slender. Ovary wholly adherent with the base of the calyx-tube. Capsule small, short,  $\frac{1}{8}$  in. long, globose or turgid, 3-lobed, bursting loculicidally, crowned with narrower short tubular calyx-limb,

Humid forests throughout the islands, *Banks and Solander*, from Bay of Islands, *A. Cunningham*, to Chalky Bay, *Lyall*.

**6. *M. Colensoi*, Hook. f. Fl. N. Z. i. 68.** A slender, twiggy, climbing shrub; branches very slender (and young leaves tomentose), terete, tetragonous at the tips. Leaves distichous, scarcely petioled,  $\frac{1}{3}$ – $\frac{2}{3}$  in., ovate or ovate-lanceolate, acuminate, rather membranous when old, glabrous on both surfaces; midrib and veins delicate. Flowers small, in axillary, rarely terminal, branched, many-flowered cymes, 1–2 in. long; peduncles and pedicels slender. Flowers with the stamens  $\frac{1}{2}$  in. long, puberulous. Calyx narrow funnel-shaped, slightly swollen at the base, produced far beyond the ovary; lobes small, broadly ovate, obtuse. Petals orbicular, scarlet. Stamens and style very slender. Ovary wholly adherent to the base of the calyx-tube. Capsule  $\frac{1}{8}$  in. long, globular, 3-lobed, bursting loculicidally, crowned by the longer narrower tubular calyx-limb.

**Northern Island:** forests of the Bay of Islands and east coast, *Edgerley, Colenso*, etc. Closely allied to *M. hypericifolia*, but at once distinguished by the slender habit, glabrous, not divaricating, branches, and acuminate leaves.

**7. *M. robusta*, A. Cunn.;—Fl. N. Z. i. 68. t. 17.** A tall, erect (never? climbing), glabrous tree, 50–60 ft. high; bark smooth, pale; branches robust, terete, the ultimate 4-gonous. Leaves decussate, petioled, 1–1 $\frac{1}{2}$  in. long, elliptic- or ovate-oblong, obtuse or retuse at the tip, very coriaceous, glabrous on both surfaces, reticulated with numerous very fine close-set veins. Flowers with the stamens 1 in. long, in dense, many-flowered, terminal, pubescent cymes; peduncles and pedicels short and thick. Calyx-tube short, obconic, scarcely produced beyond the ovary; lobes triangular, short. Petals orbicular, scarlet, shortly clawed. Stamens and style rather stout. Ovary adnate below the middle with the calyx-tube. Capsule urceolate, small,  $\frac{1}{4}$ – $\frac{1}{3}$  in., girt round the middle by the calyx-tube, the upper part free and loculicidally 3-valved.—*M. florida*, Hook. Bot. Mag. t. 4471, not Smith.

**Northern Island:** abundant in forests, *Banks and Solander*, etc. Wood hard, close-grained, good for naval purposes.

**8. *M. tomentosa*, A. Cunn.;—Fl. N. Z. i. 68.** A short, stout, much-branched tree, 30–40 ft. high; branches very stout, terete, densely tomentose. Leaves decussate, petioled, 1–3 in. long, variable in shape, from linear-lanceolate to oblong or orbicular-oblong, rounded or narrowed at the tip, very coriaceous, margins recurved, glabrous, finely reticulated above, densely or laxly clothed with snow-white tomentum below, rarely glabrous. Flowers large, with the stamens 1 $\frac{1}{2}$  in. long, in terminal many-flowered lax or dense cymes,



densely clothed with white tomentum; peduncles and pedicels very stout. Calyx-tube obconic; lobes short, triangular-ovate. Petals orbicular, scarlet, clawed, tomentose on the back. Stamens and style very long and stout. Ovary adnate below the middle with the base of the calyx-tube. Capsule  $\frac{1}{2}$  in. long, woody, girt round the middle by the calyx-tube, bursting loculicidally.—A. Rich. Flor. t. 37.

**Northern Island**: common on the rocky shores, *Banks and Solander*, etc.

9. **M. polymorpha**, *Forst.* A small, branching tree, excessively variable in foliage and in being woolly downy or glabrous; the variety from Kermadec Island has downy branches, coriaceous, petioled, decussate leaves,  $\frac{3}{4}$ – $1\frac{1}{4}$  in. long, obovate, rounded at the tip; veins finely reticulated; margins recurved. Flowers in terminal, many-flowered cymes; peduncles and calyx white, woolly. Calyx  $\frac{1}{4}$  in. long, hemispherical; lobes triangular, persistent, often tipped at the back with a black gland. Petals white or scarlet. Stamens  $\frac{1}{2}$ – $\frac{2}{3}$  in. long. Ovary woolly at the top. Capsule 3-lobed, 3-valved, sessile in the broad calyx-tube, which is attached to its middle.

**Kermadec Islands**, where it is the prevailing tree, and reaches 60 ft. high, *M'Gillivray*. One of the most variable trees in the world, abundant throughout all the Pacific islands and New Caledonia, but not found in Australia.

10. **M. scandens**, *Banks and Sol.*;—*Fl. N. Z.* i. 69. A large climbing shrub or small tree, with spreading, terete, tomentose branches. Leaves distichous,  $\frac{1}{3}$ – $\frac{1}{2}$  in., sessile, broadly ovate oblong or orbicular, obtuse, glabrous, the younger pubescent, very coriaceous, below covered with large glandular dots, 3-nerved; margins recurved. Flowers with the stamens  $\frac{1}{2}$  in. long, in short, few-flowered, subglobose, terminal, rarely lateral, pubescent cymes; peduncles and pedicels rather slender. Calyx-tube very broadly obconic; lobes short, obtuse, deciduous. Petals orbicular, whitish. Stamens and style rather slender. Ovary adnate below its middle with the base of the calyx-tube. Capsule small, globose,  $\frac{1}{6}$  in. diam., girt at the middle by the calyx-tube, the free portion loculicidally 3-valved.—*M. perforata*, A. Rich.; *M. buxifolia*, A. Cunn.; *Melaleuca perforata*, Forst. Prod.; *Leptospermum perforatum*, Forst. Gen.

Common in forests of the **Northern and Middle Islands**, *Banks and Solander*, etc. **Lord Auckland's group**, *Bolton*. Wood hard and heavy.

### 3. MYRTUS, Linn.

Trees or shrubs. Leaves evergreen, opposite, often coriaceous, pellucid-dotted. Flowers axillary, solitary or in few-flowered cymes.—Calyx-tube globose; limb 4- or 5-lobed, imbricate. Petals 4 or 5. Stamens very numerous, longer than the petals. Berry globose, crowned with the persistent calyx-lobes, 2- or 3-celled; cells many- or few-seeded. Seeds reniform or angular; testa bony; embryo terete curved, cotyledons small.

A genus scattered over the temperate and warmer countries of the globe, of which the common Myrtle is the only European example, but of which many species inhabit the south temperate zone, one extending to Cape Horn, and two to Akaroa. The genus is absent in Tasmania.

Leaves 1–2 in., tumid between the veins. . . . . 1. *M. bullata*.  
Leaves  $\frac{2}{3}$ –1 in., flat . . . . . 2. *M. Ralpii*.

Leaves obcordate, small . . . . . 3. *M. obcordata*.  
 Leaves obovate . . . . . 4. *M. pedunculata*.

1. ***M. bullata***, *Banks and Sol.*;—*Fl. N. Z.* i. 70. An erect shrub or small tree, 10–15 ft. high; branches terete, tomentose, as are the young leaves, peduncles, and calyx. Leaves shortly petioled, 1–2 in. long, broadly elliptic-ovate or orbicular-ovate, obtuse acute or apiculate, coriaceous, often red-brown when living, the surface tumid between the veins. Peduncles axillary,  $\frac{1}{2}$ –1  $\frac{1}{2}$  in., 1-flowered. Calyx-tube turbinate, 2-bracteolate at the base; lobes 4, broadly ovate, obtuse. Petals 4, orbicular, pale pink. Stamens numerous, white; filaments and style slender. Berry urceolate,  $\frac{1}{3}$  in. long, turgid, black, 2-celled, with several flat reniform seeds in each cell; testa very thick and bony; embryo very slender, curved.—*Hook. Ic. Pl.* t. 557.

**Northern** Island: frequent in forests, *Banks and Solander*, etc.

2. ***M. Ralphii***, *Hook. f. Fl. N. Z.* ii. 329. Very similar in habit, form of the foliage, and flowers to *M. bullata*, but the leaves are smaller and quite plane, the branchlets more slender, scarcely tomentose.

**Northern** Island: forests near Wellington, *Ralph*; east coast, *Colenso*. This may be a variety of *M. bullata*. I have seen no fruit.

3. ***M. obcordata***, *Hook. f. Fl. N. Z.* i. 71. A small, much-branched, erect or decumbent shrub, with slender pubescent branches. Leaves small,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, obcordate, narrowed into a short petiole, coriaceous, glabrous on both surfaces. Peduncles solitary, slender, about as long as the leaves, 1-flowered, pubescent. Flowers small, about  $\frac{1}{4}$  in. long. Fruit oblong,  $\frac{1}{4}$  in. long, black or violet, with 1 or 2 bony reniform seeds.—*Eugenia obcordata*, *Raoul*, in *Ann. Sc. Nat.* ser. iii. p. 123.

**Northern** Island: mountainous localities in the east coast and interior, *Colenso*.

**Middle** Island: Nelson, *Bidwill*; Lake Wainaka, *Haast*; Akaroa, *Raoul*.

4. ***M. pedunculata***, *Hook. f. in Ic. Pl.* t. 629;—*Fl. N. Z.* i. 71. A straggling shrub, 10–12 ft. high, glabrous, much resembling *M. obcordata*, but the branchlets are 4-gonous and perfectly glabrous, the leaves obovate or oblong-obovate, and rounded at the tip, rarely acute, and the peduncles and calyx perfectly glabrous. Berry small, very few-seeded, orange-yellow.—*Eugenia Vitis-Idea*, *Raoul*, in *Ann. Sc. Nat.* ser. iii. 2. p. 122.

**Northern** Island: hilly districts on the east coast and interior, *Colenso*. **Middle** Island: Nelson, *Bidwill*; Akaroa, *Raoul*.

#### 4. EUGENIA, Linn.

Characters almost identical with those of *Myrtus*, except that the seeds are few, large, with a thick embryo, often presenting no traces of cotyledons. The New Zealand species of *Myrtus* further differ from *Eugenia* *Maire*, in wanting the corymbose inflorescence.

A tropical genus, abounding in Asia and America, and extending into New Zealand and Chili; it is absent in Tasmania.

1. ***E. Maire***, *A. Cunn.*;—*Fl. N. Z.* i. 71. A small tree, with the habit of a *Metrosideros*, 30–50 ft. high, everywhere glabrous; bark white; branches slender; twigs 4-angled. Leaves petioled, 1–2 in. long, oblong-lanceolate, acuminate, membranous, with delicate veins. Flowers almost unisexual,

in terminal, branched, many-flowered corymbs 2-3 in. diam., white; peduncles and pedicels very slender, the latter often in threes. Calyx-tube broadly obconic; lobes very short, broad, deciduous. Petals orbicular, often falling before expanding. Stamens and style very slender,  $\frac{2}{3}$  in. long. Ovary wholly adnate with the base of the calyx-tube, 2-celled, with many ovules on the septum of each cell. Berry  $\frac{1}{3}$  in. long, urceolate or broadly pyriform, crowned with the narrower cup-shaped calyx-limb, 1-celled, 1-seeded. Seed large; testa coriaceous; cotyledons large, amygdaloid.

Northern parts of the **Northern** Island: in swampy ground, *Cunningham*, etc.

## ORDER XXIX. ONAGRARIÆ.

Herbs shrubs or rarely trees. Leaves opposite or alternate, simple, exstipulate. Flowers usually regular, hermaphrodite.—Calyx-tube often elongate, adherent to the ovary, and sometimes produced beyond it; limb 4- (rarely 2-5-) lobed, valvate. Petals as many as lobes of calyx, or 0, inserted on the calyx, spreading or convolute. Stamens as many or twice as many as the petals, inserted with them, free. Ovary inferior, 2-4-celled; style straight, stigma capitate or clavate; ovules usually very numerous in the angles of the cells. Fruit a capsule or berry. Seeds small, exalbuminous, sometimes provided with a tuft of hairs; embryo straight.

A large Order in all temperate and many tropical parts of the world, to which the *Eno-thera*, *Clarkia*, and various other garden plants now cultivated in New Zealand belong.

Ovary oblong, terete. Fruit a berry . . . . . 1. *FUCHSIA*.  
Ovary linear, 4-angled. Fruit a capsule . . . . . 2. *EPILOBIUM*.

### 1. *FUCHSIA*, Linn.

Shrubs or small trees. Leaves alternate or opposite or whorled. Flowers pendulous, long-pedicelled.—Calyx-tube ovoid, produced into a tubular or campanulate, deciduous, 4-lobed limb, the lobes large, spreading, acuminate. Petals 0 or 4, concave or convolute. Stamens 8, much longer than the petals. Ovary crowned with an urceolate disk, 4-celled; style slender, stigma capitate or clavate; ovules very numerous. Berry ovoid, fleshy, 4-celled, many-seeded.

A very large South American, and especially Andean genus of most beautiful plants, found nowhere in the Old World but in New Zealand.

Stem erect, subarborescent. Leaves 2-3 in. Petals small . . . . . 1. *F. excorticata*.  
Stem prostrate. Leaves slender. Petals 0, or small . . . . . 2. *F. procumbens*.

1. *F. excorticata*, Linn. f.;—*Fl. N. Z.* i. 56. A large bush or small tree, 10-30 ft. high, with the trunk sometimes 3 ft. diam., covered with ragged, papery bark; branches brittle. Leaves alternate, twice as long as their slender petioles, very variable in length,  $1\frac{1}{2}$ - $3\frac{1}{2}$  in. long, lanceolate or ovate-lanceolate, acuminate, obscurely toothed, membranous, green above, silvery below. Flowers axillary, solitary, on long, slender, drooping peduncles, shorter than the petioles,  $\frac{3}{4}$ -1 in. long. Calyx dingy-purple, globular above the ovary, then contracted and lengthened into a funnel-shaped 4-cleft tube; lobes lanceolate, very acuminate. Petals much smaller than the calyx-lobes, lanceolate, red-purple. Stamens exserted; anthers oblong. Ovary linear-oblong;

stigma globose. Berry oblong, fleshy.—Bot. Reg. t. 857.; *Skinnera excorticala*, Forst.

Damp woods throughout the islands, abundant, *Banks and Solander*, etc. The wood, which is soft and useless, contains much tannic and gallic acids, *Buchanan*. A small form, found at Otago by Lindsay and Heator, has much smaller and broader leaves, approaching *F. procumbens*.

2. **F. procumbens**, *R. Cunn.*;—*Fl. N. Z.* i. 57. A procumbent, scarcely shrubby plant, with prostrate, slender branches. Leaves small,  $\frac{1}{2}$ –1 in. long, as long as or shorter than the very slender petioles, broadly ovate or orbicular, cordate or rounded at the base, acute, very obscurely toothed. Flowers as in *F. excorticala*, but usually smaller.—Hook. Ic. Pl. t. 421.

Damp forests in the **Northern Island**, from the east coast southward. **Middle Island**: Canterbury plains, *Travers*. The extreme forms of this and the former differ greatly, but I have apparently intermediate states.

## 2. **EPILOBIUM**, Linn.

Perennial herbs. Stem sometimes woody below, creeping prostrate or erect from a decumbent base. Leaves opposite or alternate, exstipulate, usually toothed. Flowers often drooping in bud, then erect, white pink rosy or purplish, axillary or subterminal.—Calyx-tube very long, adnate with the tetragonous ovary; limb of 4 deciduous lobes. Petals 4, spreading, obovate or obcordate. Stamens 8, perigynous. Ovary 4-celled; style short, stigma obliquely clavate (4-cleft in some European species); ovules very numerous. Capsule very long, linear, splitting into 4 recurved, slender valves, very many-seeded. Seeds small, with a pencil of white hairs at the tip.

A very large genus in almost all temperate climates, rare in the tropics, especially abounding in New Zealand. The species are, without exception of locality or country, extremely variable, and probably hybridize. I have repeatedly studied the New Zealand ones, many of which completely puzzle me. The following descriptions represent in many cases perhaps prevalent forms rather than species; and the student will certainly find intermediates between most of them. It is useless attempting to name many species, till copious suites of specimens are collected, the characters being to a great extent comparative.

\* *Small, glabrous species, 1–6 in. long. Branches prostrate and creeping, their tips only ascending. Leaves all opposite, uniform in size. Flowers few, chiefly from the axils of leaves remote from the ends of the branches.*

Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in., sessile, scarcely toothed . . . . .	1. <i>E. nummularifolium</i> .
Leaves $\frac{1}{3}$ in., oblong or orbicular, coriaceous, purple below . . . . .	2. <i>E. purpuratum</i> .
Leaves $\frac{1}{2}$ in., petioled, orbicular, sharply toothed . . . . .	3. <i>E. linæoides</i> .
Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in., oblong, obscurely toothed . . . . .	4. <i>E. macropus</i> .

\*\* *Small alpine and subalpine, glabrous, glossy species. Branches creeping, ascending at the tips, rarely suberect. Leaves all opposite, nearly uniform, obtuse, coriaceous, nerveless. Flowers few, usually small, from towards the tips of the branches.*

Leaves $\frac{1}{2}$ – $\frac{1}{2}$ in., oblong, sinuate-toothed. Flowers small . . . . .	5. <i>E. confertifolium</i> .
Leaves 1 in., sessile, spatulate-oblong. Flowers rather large . . . . .	6. <i>E. crassum</i> .
Leaves 1 in., petioled, narrow oblong, subacute . . . . .	7. <i>E. brevipes</i> .

\*\*\* *Small, slender, usually prostrate, lowland species. Branches ascending or suberect. Leaves opposite or upper alternate (not glossy),  $\frac{1}{4}$ –1 in. long. Flowers towards the ends of the branches, usually numerous and small.*

Leaves $\frac{1}{5}$ – $\frac{1}{3}$ in., petioled. Flowers very small. Peduncles of fruit long. . . . .	8. <i>E. alsinoides</i> .
--	---------------------------



Stem rigid, black. Leaves  $\frac{1}{3}$ – $\frac{1}{2}$  in., sessile. Flowers very small.

- Peduncles of fruit short . . . . . 9. *E. microphyllum*.  
 Leaves  $\frac{1}{2}$ – $\frac{2}{3}$  in., broad, sharply toothed. Flowers larger. Peduncles of fruit long . . . . . 10. *E. rotundifolium*.

\*\*\*\* Stem erect or decumbent at the very base, 6–24 in. high. Leaves opposite or alternate. Flowers subterminal.

† Flowers usually less than  $\frac{1}{2}$  in. diam.

- Glabrous. Leaves opposite, narrowed at base, in scattered pairs, coriaceous . . . . . 11. *E. glabellum*.  
 Glabrous. Stems rigid, black. Leaves opposite, narrowed at base, crowded, linear . . . . . 12. *E. melanocaulon*.  
 Glabrous. Leaves opposite, broad at base, sessile or  $\frac{1}{2}$  amplexicaul . . . . . 13. *E. tetragonum*.  
 Pubescent. Leaves opposite and alternate, sessile . . . . . 14. *E. junceum*.

†† Flowers usually  $\frac{1}{3}$ –1 in. diam.

- Pubescent. Leaves most alternate, all petioled, broad. Flowers numerous . . . . . 15. *E. pubens*.  
 Glabrous. Leaves mostly opposite, sessile, narrow at base, linear-oblong . . . . . 16. *E. Billardierianum*.  
 Tall, puberulous above. Leaves opposite, sessile, 2–3 in., linear . 17. *E. pallidiflorum*.

1. ***E. nummularifolium***, A. Cunn.;—*Fl. N. Z.* i. 57. Small, prostrate, branched, slender; branches 2–6 in. long, glabrous or bifariously pubescent. Leaves  $\frac{1}{6}$ – $\frac{1}{3}$  in. long, sessile or petioled, numerous, opposite, rather crowded, uniform in size, orbicular or oblong, obtuse, entire or waved at the margin, coriaceous or thin, flat or convex, usually with the under surface lying flat on the soil. Peduncles axillary, slender,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long. Flowers very small, pink or whitish. Ovary and capsule generally hoary.

Var. *a. pedunculare*, *Fl. N. Z.* i. 58. Leaves membranous; peduncles long and slender; capsule glabrous.—*E. pedunculare*, A. Cunn.; *E. pendulum*, Banks and Sol.

Var. *β. nerteroides*, *Fl. N. Z.* i. c. Leaves thick, with recurved margins; peduncles long; capsule glabrous.—*E. nerteroides*, A. Cunn.

Var. *γ. brevipes*, *Fl. N. Z.* i. c. Leaves thick, coriaceous, with recurved margins; peduncles very short; capsule puberulous.

Abundant in wet places, var. *a* and *β*, throughout the islands, *Banks and Solander*, var. *β* extending to **Lord Auckland's** group; var. *γ*, dry places, Cape Palliser, *Colenso*. A very common and variable plant, best known by its small size, creeping stems, small, crowded, rounded, and scarcely toothed leaves, which are uniform in size throughout the plants, and flowers axillary and distant from the ends of the branches. States with ascending branches approach very closely *E. alsinoides*.

2. ***E. purpuratum***, *Hook. f. n. sp.* Small, glabrous, ereeping; branches short, black, leafy, 2–3 in. long. Leaves spreading horizontally, shortly petioled,  $\frac{1}{2}$  in. long, thickly coriaceous, orbicular or ovate-oblong, obtuse, almost entire, under surface and edges dark-purple; veins obscure. Peduncles from the axils distant from the ends of the branches, stout, black, 1–2 in. long. Capsules  $1\frac{1}{2}$ –2 in. long, black, quite glabrous.

Middle Island: alps of Otago, alt. 6000 ft., *Hector*. Closely allied to *E. nummularifolium*, but much larger, with stout black stems and peduncles and long capsules.

3. ***E. linnaeoides***, *Hook. f. Fl. Antarct.* i. 9. t. 6;—*Fl. N. Z.* i. 58. Slender, prostrate, branched, creeping, everywhere quite glabrous. Leaves all opposite, petioled, orbicular, sharply toothed, uniform in size, very membranous,  $\frac{1}{2}$  in. long. Peduncles very slender, fruiting ones 3–5 in. long.

Flowers pale rose-coloured, petals cleft nearly to the middle. Capsules 2-3 in. long, glabrous.

Mountainous districts throughout the islands, in wet places, *Banks and Solander*, etc.; most abundant in **Lord Auckland's** group and **Campbell's** Island, *J.D.H.* The slender creeping habit, uniform, membranous, orbicular, sharply-toothed, opposite leaves, and few axillary flowers, well distinguish this species, which is one of the best characterized of the genus. It most nearly approaches *E. rotundifolium*, but differs in all the leaves being opposite, and branches creeping.

4. ***E. macropus***, *Hook. Ic. Pl. t. 812*;—*Fl. N. Z. i. 58*. Glabrous throughout, branching from the base; branches slender, creeping below, then ascending or erect, 4-8 in. long, often purplish-green or blackish. Leaves almost all opposite, petioled, oblong or ovate-oblong, obtuse, very obscurely toothed, rather thick,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, uniform in size. Flowers few, distant from the ends of the branches, almost  $\frac{1}{3}$  in. diam., on slender long peduncles. Capsules quite smooth.

**Middle Island**: marshy places in the mountains from Nelson to Otago, alt. 2500-5000 ft. The narrower, uniformly opposite, almost entire leaves, and large flowers distinguish this at once from *E. rotundifolium*; the less crowded leaves and large flowers from *E. confertifolium*; and the habit, and fewer flowers usually distant from the ends of the branches from various species of the following sections, especially *E. Billardierianum*.

5. ***E. confertifolium***, *Hook. f. Fl. Antart. i. p. 10*. Small, almost glabrous, sparingly branched, prostrate; branches stout, 1-4 in. long, densely leafy, their tops erect or almost wholly erect. Leaves all opposite,  $\frac{1}{5}$ – $\frac{1}{2}$  in. long, oblong linear-oblong or obovate-oblong, obtuse, coriaceous, shining, obscurely toothed, nearly uniform, or the uppermost rather smaller. Flowers in the axils of the upper leaves, on rather short peduncles, small,  $\frac{1}{8}$  in. diam. Capsules glabrous or puberulous.—*Hook. Ic. Pl. t. 685*.

Var.  $\alpha$ . Stems short. Leaves crowded, scarcely toothed. Peduncles very short.

Var.  $\beta$ . *tenuipes*. Leaves linear-oblong, more conspicuously toothed. Peduncles in fruit very slender.—*E. tenuipes*, *H. f. Fl. N. Z. i. 59*.

Mountain swamps, var.  $\alpha$ , in the **Middle Island**; Canterbury and Otago mountains, alt. 3-5000 ft.; abundant in **Lord Auckland's** group and **Campbell's** Islands. Var.  $\beta$ . **Northern Island**: head of the Wairarapa valley, *Colenso*. Also found in the Tasmanian alps, and a very similar plant occurs in the Chilian Andes (*E. nivale*, *Meyen*). A very variable species, differing chiefly in habit from *E. Billardierianum*.

6. ***E. crassum***, *Hook. f. Fl. N. Z. ii. 328*. Glabrous, prostrate, creeping, glossy; branches short, thick, red, densely leafy, 2-4 in. long. Leaves ascending, opposite,  $\frac{3}{4}$ –1 $\frac{1}{4}$  in. long, obovate- or spatulate-oblong, obtuse, very obscurely toothed, narrowed into a broad red petiole, very coriaceous, bright and glossy. Flowers few, from towards the ends of the branches. Peduncles short and stout, lengthening in fruit. Flowers large, nearly  $\frac{1}{2}$  in. across. Capsules glabrous, stout, 1 $\frac{1}{2}$  in. long.

**Middle Island**: in alpine localities. Top of Macrae's Run, alt. 4000 feet, *Munro*; Wairau mountains, alt. 4-5000 ft., *Travers*. A very fine species, allied to the following, and not readily distinguished except by the more creeping habit, and leaves broadest towards the tips, larger flowers, and long pedicels of the capsules.

7. ***E. brevipes***, *Hook. f. Fl. N. Z. ii. 328*. Glabrous, stout, branching, coriaceous, glossy; branches all prostrate, red, almost woody below, leafy, 4-6 in. long. Leaves all opposite, spreading,  $\frac{3}{4}$ –1 in. long, narrow oblong, subacute, minutely remotely toothed, very coriaceous, glossy, the lower red-

dish, nerveless, petioles slender red. Flowers numerous towards the ends of the branches, nearly  $\frac{1}{2}$  in. across, on very short peduncles that do not elongate after flowering. Capsules slender, glabrous, about 1 in. long.

**Middle Island:** Macrae's Run, alt. 4000 ft., *Munro*; Kaikora mountains, *M'Donald*. A remarkable species, of which I have fine specimens, but from Dr. Munro only, by whose shepherd it was collected: it may be a luxuriant form of *E. crassum*.

8. ***E. alsinoides*, A. Cunn.**;—*Fl. N. Z.* i. 59. Very slender, branched, prostrate, pubescent, small-leaved; branches green or reddish, 2–8 in. long. Leaves all opposite, in scattered or crowded pairs,  $\frac{1}{8}$ – $\frac{1}{2}$  in. long, oblong-orbicular or ovate- or linear-oblong, obtuse, obscurely toothed, sessile or shortly petioled. Flowers few, very small, towards the very ends of the branches, on short peduncles which lengthen much after flowering. Capsule very slender, pubescent.—*E. thymifolium* and *atriplicifolium*, A. Cunn.

Abundant in lowland marshes and wet ground throughout the islands, *Banks and Solander*, etc. The very slender habit, less coriaceous leaves, and pubescence distinguish this at once from *E. confertifolium*, the terminal inflorescence from *E. nummularifolium*, the small sessile leaves from *E. rotundifolium*, and the habit and pale stems from *E. microphyllum*.

9. ***E. microphyllum*, A. Rich. Flor.** 325. *t.* 36;—*Fl. N. Z.* i. 59. Rigid, strict, erect, wiry, generally much branched at the base; branches stout, simple, black, 4–6 in. long, glabrous or bifariously pubescent. Leaves all opposite, very uniform, small,  $\frac{1}{8}$ – $\frac{1}{6}$  in. long, sessile or very shortly petioled, ovate oblong or orbicular, obtuse, obscurely toothed, coriaceous. Flowers few, towards the ends of the branches, very small, on short peduncles which elongate but little in fruit. Capsules glabrous or pubescent, 1 in. long.

**Northern and Middle Islands:** not uncommon in moist places, *Banks and Solander*, etc.

10. ***E. rotundifolium*, Forst.**;—*Fl. N. Z.* i. 58. Erect or decumbent; stems weak, terete, 6–12 in. high, pubescent or glabrous. Leaves uniform throughout the plant, all opposite or more often the upper alternate,  $\frac{1}{4}$ – $\frac{2}{3}$  in., shortly petioled, orbicular or oblong, unequally toothed, rarely ovate or oblong and entire, glabrous or puberulous. Flowers in the axils of the uppermost leaves, small, pink,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam.; peduncles very short, in fruit long and slender. Capsule glabrous or pubescent,  $1\frac{1}{2}$  in. long, very slender.

Abundant in moist places throughout the islands, *Banks and Solander*, etc. Very distinct in its usual form; distinguished from *E. alsinoides* by its greater size, from *E. linnaeoides*, by the more or less erect habit, subterminal inflorescence, and smaller flowers.

11. ***E. glabellum*, Forst.**;—*Fl. N. Z.* i. 59. Stem erect or decumbent at the base, often much-branched below, terete, 6–12 in. high, glabrous or bifariously pubescent. Leaves in rather scattered pairs, sessile or shortly petioled,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long, oblong ovate- or lanceolate-oblong, obtuse, obtusely sinuate-toothed, rather coriaceous, sometimes shining. Flowers in the axils of the upper leaves, variable in size, pink,  $\frac{1}{6}$ – $\frac{1}{3}$  in. diam.; peduncles very short, when fruiting rarely longer than the leaves. Capsules 1– $1\frac{1}{2}$  in. long, slender, glabrous or puberulous.

Abundant in upland districts in the **Northern** Island and throughout the **Middle** Island, *Banks and Solander*, etc. Abundant in temperate South America and Tasmania, where it becomes very large and the leaves very membranous. Nearly allied to *E. Billardieria*-

*num*, which differs only in its large flowers; extremely near *E. confertifolium*, which creeps and has crowded leaves. Small states pass into *E. alsinoides*, and others into *E. tetragonum*.

12. ***E. melanocaulon***, *Hook. Ic. Pl. t.* 813;—*Fl. N. Z.* i. 60. Erect, 6–12 in., rigid; branches simple from a decumbent woody stem, terete, shining, black or dark-red, glabrous. Leaves crowded, mostly opposite,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, subpetioled, linear-oblong, obtuse, deeply lobed or sinuate-toothed, coriaceous, glabrous, often shining, yellow-red when dry. Flowers small,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam., pink, sessile in the upper leaves; ovaries short; peduncles very short, rarely exceeding the leaves when fruiting. Capsules  $\frac{1}{2}$ –1 in. long.

Common in mountainous districts of the **Northern** and throughout the **Middle** Island: alt. 2–5000 ft. A very well-marked species, readily known, in its usual form, by its erect, rigid habit, dark stem and branches, very numerous, crowded, small, coriaceous leaves and short, sessile ovaries. States of it are difficult to separate from *E. confertifolium*, *glabellum*, and *brevipes*.

13. ***E. tetragonum***, *Linn.*;—*Fl. N. Z.* i. 60. Stems robust, erect or with a very short decumbent base, 12–18 in. high, stout, terete or 4-gonous, glabrous or puberulous. Leaves opposite, 1–2 in. long, sessile or semiamplexicaul, broadly oblong or obovate-oblong, obtuse, irregularly toothed, glabrous, rather membranous, never shining, green. Flowers rather small,  $\frac{1}{3}$  in. diam., pink, very numerous towards the ends of the branches; peduncles shorter than the leaves, scarcely lengthening in fruit. Capsules 1–2 in. long, hoary.

**Northern** and **Middle** Islands: not uncommon in moist places. A common plant in the temperate regions of both hemispheres, very variable, distinguished by the small flowers and sessile or semiamplexicaul leaves, but states of it are difficult to distinguish from *E. Biltardierianum*, *juncum*, and *pubens*.

14. ***E. juncum***, *Forst.*;—*Fl. N. Z.* i. 60. Erect, very pubescent or tomentose, rather rigid, leafy; stem stout, decumbent and rather woody at the base; branches stout or slender, 4–24 in. high, terete, often proliferous at the axils of the leaves. Leaves narrow, very variable, 1–3 in. long, alternate and opposite, sessile, the upper gradually smaller, linear-oblong, sinuate-toothed or nearly entire, narrowed or not at the base, usually pubescent on both surfaces. Flowers copiously produced towards the ends of the branches, rather small,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam., purple; peduncles generally shorter than the leaves, lengthening in fruit. Capsules pubescent, 1–3 in. long.—*E. cinereum*, A. Rich.; *E. virgatum*, *confertum*, *hirtigerum*, and *incanum*, A. Cunn.

Abundant throughout the islands, *Banks* and *Solander*, etc. Abundant in Tasmania, Australia, and South Chili, passing into *E. tetragonum* and *glabellum*.

15. ***E. pubens***, A. Rich. *Flor.* 329. t. 36;—*Fl. N. Z.* i. 61. Stems erect from a woody decumbent base, 6–24 in. high, simple or branched; branches terete, pubescent, leafy, often proliferous at the axils. Leaves almost always alternate, long-petioled, ovate-oblong, obtuse, rather sharply toothed, membranous, pubescent on both surfaces, the upper gradually smaller. Flowers numerous towards the ends of the branches,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., white pink or purplish; peduncles of both flower and fruit always shorter than the leaves. Capsules pubescent, 1–2 in. long.—*E. haloragifolium*, A. Cunn.

Abundant on dry hills, etc., throughout the islands, *Banks* and *Solander*, etc. One of the most distinct species of the genus, at once known by its erect stems, slender petioles, and usually alternate, ovate-oblong, obtuse leaves, etc.; it is allied to the European *E. roseum*.



16. **E. Billardierianum**, *Seringe*;—*Fl. N. Z. i.* 61. Slender, simple or sparingly branched, glabrous or puberulous; stems decumbent at the base; branches 6–18 in. high, terete, sparingly leafy. Leaves opposite and alternate,  $\frac{1}{2}$ –1 in. long, sessile or very shortly petioled, linear-oblong or narrow ovate-oblong, obtuse, toothed, membranous, the upper gradually smaller. Flowers few towards the ends of the branches, rather large,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam., white or rosy; peduncles usually longer than the leaves. Capsules  $1\frac{1}{2}$ –3 in. long, pubescent.

Mountainous parts of the **Northern** Island, *Colenso*. More common in the **Middle** Island, *Lyall*, etc. A most puzzling plant, and one of which I am almost inclined to refer the various forms to large-flowered states of *tetragonum*, *glabellum*, *alsinoides*, *junceum*, and perhaps others. None of the New Zealand specimens have leaves so sessile and semi-amplexicaul as those figured in the Tasmanian Flora: nor am I certain that either is the true plant of *Seringe*, which is very imperfectly described.

17. **E. pallidiflorum**, *Sol.*;—*Fl. N. Z. i.* 61. The largest New Zealand species. Stems erect, 1–3 ft. high, terete, as thick as a goose-quill, leafy, simple or branched, glabrous or puberulous. Leaves opposite, 2–4 in. long, sessile, semiamplexicaul, linear-lanceolate or -oblong, acute, jagged or toothed, glabrous. Flowers large,  $\frac{3}{4}$ –1 in. diam., white or pale-pink, numerous towards the ends of the branches; peduncles always shorter than the leaves. Capsule 2–3 in., hoary.—*E. macranthum*, Hook. f. *l.c.* Pl. t. 297.

Abundant in wet places throughout the islands, *Banks* and *Solander*, etc. A very distinct species, also common in Tasmania, at once recognized by its great size, long, sessile, narrow leaves and large flowers.

## ORDER XXX. PASSIFLOREÆ.

Climbers (rarely erect shrubs), with lateral tendrils or 0. Leaves alternate, stipuled, entire or lobed. Flowers axillary, solitary or rarely racemose, usually hermaphrodite, often showy.—Calyx free; tube short; lobes 4 or 5 (rarely 3) long, imbricate. Petals 3–5, inserted at the base of the calyx, usually persistent (rarely 0), sometimes with a crown of filaments at their base. Stamens generally as many as the petals; filaments often adnate to the stalk of the ovary. Ovary often stalked, 1-celled; styles 3–5; ovules many on 3–5-parietal placentas. Fruit coriaceous or succulent, indehiscent or splitting between the placentas. Seeds often arilled, exalbuminous; cotyledons flat.

A large tropical family, abounding in America, rarer in Asia.

### 1. PASSIFLORA, Linn.

Flowers unisexual or hermaphrodite.—Calyx-lobes 4 or 5. Petals as many, with a ring of filaments at their base. Stamens 4 or 5; filaments quite adnate with the stalk of the ovary; anthers versatile, those of the female flower, imperfect. Styles 2 or 3, with capitate stigmas. Fruit an indehiscent berry.

A very large American genus, of which the few Old-World representatives are more or less diocious and tetramerous.

1. **P. tetrandra**, *Banks* and *Sol.*;—*Fl. N. Z. i.* 73. A lofty, glabrous climber, with slender, terete branches. Leaves  $1\frac{1}{2}$ –4 in., petioled, lanceolate, acuminate, quite entire, eglandular; tendrils long and slender. Flowers  $\frac{1}{2}$  in.

diam., green, in 2-4-flowered cymes; peduncles and pedicels slender, the latter jointed below the middle, ebracteate. Sepals 4, oblong, obtuse. Petals like the sepals. Filaments of corona slender, shorter than the petals. Stamens with very slender filaments. Fruit nearly globular, orange-coloured, 1-1½ in. diam., many-seeded. Seeds flat; testa wrinkled.—*Tetraphæa australis*, Raoul, Choix, t. 27.

**Northern** and **Middle** Islands: not uncommon in skirts of woods, as far south as Akaroa, *Banks* and *Solander*, etc.

## ORDER XXXI. CUCURBITACEÆ.

Climbing or prostrate, weak, straggling herbs, rarely stout and woody, with tendrils from the sides of the stem near the petioles. Leaves alternate, exstipulate, usually palmately veined and lobed. Flowers mostly unisexual.—Calyx superior (or adherent at the base) and produced above the ovary, usually campanulate, 5-toothed or -lobed. Petals 5, free or united into a 5-lobed corolla, often continuous and confluent below with the calyx-tube. Male fl.: Stamens 3 or 5, free or more or less combined; anthers often confluent into a waved or curved mass. Female fl.: Ovary inferior, usually 1-celled when very young, placentæ becoming thick and meeting together in the axis of the ovary, which they divide into 3-6 cells; styles 3-fid or 3-partite, stigmas entire or lobed; cells 1- or more ovuled. Fruit succulent or coriaceous, indehiscent or bursting irregularly, few- or many-seeded. Seeds usually flat; testa coriaceous or bony; albumen 0; cotyledons large, flattish.

A large Order, abundant in the tropics, rare in the temperate zone, to which the Cucumber, Melon, and whole family of Gourds, Pumpkins, etc., belong. All are bitter and poisonous in a wild state.

### 1. **SICYOS**, Linn.

Prostrate or climbing herbs.—Male flowers racemed. Calyx campanulate, 5-toothed. Corolla continuous with the calyx, 5-lobed. Anthers 3-5, on the summit of a short dilated column; cells confluent. Female flowers capitate on an axillary peduncle, solitary or umbelled. Calyx-tube adnate with the ovary; limb campanulate, free, 5-toothed. Ovary 1-celled, 1-ovuled, with a trifid style. Fruit a small coriaceous spinous nut.

A small, not uncommon, tropical and subtropical genus.

1. **S. angulatus**, Linn.;—*Fl. N. Z.* i. 72; ii. 329. Stems climbing and trailing, often several feet long, glabrous or nearly so. Leaves petioled, 2-5 in. diam., broadly reniform with a deep sinus, palmately 5-7-lobed, toothed, glabrous or scabrid above and pubescent beneath. Tendrils palmately divided at the apex of a long petiole. Male and female inflorescences often from the same axil; male peduncle often several in. long. Flowers green, ½ in. diam., pedicelled. Corolla-lobes obtuse. Anthers 3, convolute on the circumference of a very short, broad, dilated column. Female flower on shorter peduncles. Ovary hispid with stiff bristles. Nuts 5-7 together, ovate, sessile, compressed, 1-seeded, densely clothed with barbed spines.

**Northern** and northern parts of the **Middle** Islands: on the coast abundant in many

places, *Banks and Solander*, etc. **Kermadec** group, *M' Gillivray*. Also a native of Australia, Tasmania, and both shores of America. A. Gray (Bot. U. S. Expl. Exped. i. 648) keeps this distinct from *S. angulatus*, as *S. australis*, Endl., but I find no characters.

## ORDER XXXII. FICOIDEÆ.

The New Zealand species are succulent herbs, with opposite or alternate exstipulate leaves, but the habit of the Order is very various. Flowers uni- or bi-sexual, regular.—Calyx superior or inferior, 4- or many-cleft, persistent. Petals perigynous or epigynous, 4 or 5 or very numerous. Stamens 4 or 5 or very numerous; filaments free; anthers oblong. Ovary inferior or superior, 2- or more celled; styles as many as the ovary cells; ovules solitary or numerous in the cells. Fruit very various, capsular drupaceous or baccate. Seeds usually with farinaceous albumen and terete curved or annular embryo.

A considerable Order, scattered over the temperate and tropical regions of the globe.  
 Petals numerous. Capsule dehiscent at the top . . . . . 1. MESEMBRYANTHEMUM.  
 Petals 0. Drupes 3–8-celled . . . . . 2. TETRAGONIA.

### 1. MESEMBRYANTHEMUM, Linn.

Succulent, usually creeping plants.—Calyx-tube adnate to the ovary, limb 5-parted. Petals very numerous, linear. Stamens very numerous. Ovary inferior, 4- or more celled; styles free or connate; ovules very numerous, attached to the bases of the cells by long funicles. Capsule bursting by valves at the exposed top, the rest included in the calyx-tube. Seeds numerous, subglobose or pyriform.

An immense South African genus, rare elsewhere.

1. **M. australe**, *Soland.*;—*Fl. N. Z.* i. 76. Stems woody, terete, creeping, 1–2 ft. long, rooting at the nodes. Leaves opposite, 1–3 in. long, fleshy, linear, triquetrous, acute, glaucous, punctate, variable in thickness. Peduncles axillary, solitary, very thick, shorter or longer than the leaves. Flowers  $\frac{3}{4}$ –1 in. diam., pink or white, unisexual. Calyx-tube fleshy, obconic, lobes 5, unequal, the inner smaller. Petals 50–60, linear. Capsule 5-celled, 5-valved. Seeds minute, with a dark-brown, smooth testa.

Common on rocky and sandy shores throughout the islands, *Banks and Solander*, etc. Fruit full of red colouring-matter, *Buchanan*. Also abundant in Australia and Tasmania, and is, I suspect, not very different from the Cape of Good Hope *M. crassifolium*, Linn.

### 2. TETRAGONIA, Linn.

Scandent or trailing (or erect), succulent herbs. Leaves alternate, petioled. Flowers axillary, peduncled.—Calyx-tube adnate with the ovary, limb 3- or 4-cleft. Petals 0. Stamens 1 or more, perigynous, filaments filiform. Ovary inferior, 3–8-celled; styles 3–8; ovules solitary. Fruit a drupe or bony nut, globose or obconic and 4-angled with the angles produced and sometimes proliferous. Testa membranous.

A large South African genus, containing also a few Japan, Australian, New Zealand, and American species.

Leaves 1-3 in. long. Fruit 4-sided, turbinate . . . . . 1. *T. expansa*.  
 Leaves 1 in. long. Fruit globose, red . . . . . 2. *T. trigyna*.

1. ***T. expansa***, Murray;—*Fl. N. Z.* i. 77; ii. 329. A trailing or subscandent herbaceous plant, glabrous or sparsely puberulous, glistening with cellular papillæ. Leaves petioled, 1-3 in. long, ovate or rhomboid, obtuse, entire or sinuate. Flowers on short peduncles,  $\frac{1}{4}$  in. long. Calyx urceolate, 4-lobed. Stamens 4-8, irregularly inserted. Styles 3-8, recurved. Fruit about  $\frac{1}{3}$  in. long, turbinate or obpyramidal with the angles produced, 3-8-celled.—*Bot. Mag. t.* 2362; *T. halimifolia*, Forst.

Abundant near the sea, in many parts of both the islands, *Banks and Solander*, etc. Has been cultivated in Europe as New Zealand Spinach. Also a native of Japan, Australia, Tasmania, and South America.

2. ***T. trigyna***, *Banks and Sol.* Smaller than *T. expansa*; leaves broader. Flowers smaller; styles 3. Drupe small, globose, fleshy, bright-red,  $\frac{1}{6}$  in. diam.

**Northern Island:** east coast, *Banks and Solander*. Sand-hills, Cape Turnagain, *Cotenso*. Auckland, *Sinclair*. In the dried state it is difficult to distinguish this from *T. expansa*, but the figure in the Banksian collection represents a very different plant, of smaller size, with rounder leaves, and with unarmed and fleshy drupes.

## ORDER XXXIII. UMBELLIFERÆ.

Herbs, rarely shrubs, often aromatic or rank-smelling when bruised. Leaves chiefly radical, usually much divided; petioles sheathing at the base. Flowers small, in lateral or terminal umbels (capitate in *Eryngium* and sometimes in *Hydrocotyle*), which are simple or compound; bracts when present forming involucre.—Calyx-tube adnate with the ovary, limb truncate or 5-toothed. Petals 5, inserted round an epigynous disk, their tips often inflexed, valvate or imbricate. Stamens 5; filaments incurved. Ovary inferior, 2-celled; styles 2, stigmas terminal; ovules 1 in each cell, pendulous. Fruit separating into 2 dry carpels, each often with prominent ribs or wings, the pericarp often traversed with longitudinal oil-canals (vittæ). Seed linear; embryo minute; albumen horny.

A very large Order, especially in the northern temperate zone, rarer in the southern, to which the Celery, Carrot, Parsnip, etc., belong. Distinguished from *Araliaceæ* chiefly by habit.

Stems rhizomes or scious ereeping. Umbels simple or capitate. Leaves never pinnate.

*Stems usually slender and creeping. Leaves broad, simple or 3-foliolate, not spiny. Flowers capitate.*

Fruit flat, much laterally compressed . . . . . 1. HYDROCOTYLE.

Fruit 4-gonous, dorsally rounded or compressed . . . . . 2. POZOA.

*Stems creeping. Leaves terete, fistular, septate. Umbel simple* . . . . . 3. CRANTZIA.

*Stems creeping. Leaves spinescent. Umbels crowded into a very dense ovoid head* . . . . . 4. ERYNGIUM.

Stems erect, rarely scandent, without ereeping rhizomes or scious.

*Umbels simple. Leaves pinnate or 2-3-pinnate* . . . . . 5. OREOMYRRHIS.

*Umbels compound.*

Stems prostrate. Umbels lateral. Involucre 0 . . . . . 6. APIUM.

Stems rigid, spinescent. Umbels spiked or panicle . . . . . 7. ACIPHYLLA.



- Aromatic herbs. Umbels terminal. Carpels with 3-5 equal, narrow wings . . . . . 8. *LIGUSTICUM*.  
 Herbs or climbing shrubs. Leaves simple or compound. Carpels with 2 broad, lateral wings . . . . . 9. *ANGELICA*.  
 Herbs. Leaves compound. Carpels prickly . . . . . 10. *DAUCUS*.

### 1. *HYDROCOTYLE*, Linn.

Herbs, with long, slender, creeping, often tufted stems. Leaves alternate, rarely fascicled, reniform or orbicular, petioles slender, dilated and membranous at the base. Umbels or heads small, simple. Involucral leaves few or 0. Flowers very minute.—Calyx-limb obsolete. Petals valvate, flat or incurved, but tips not inflexed. Fruit orbicular, much laterally flattened. Carpels placed edge to edge, each with one or few (sometimes obsolete) ribs on each face.

A rather extensive genus, found in all moist temperate regions. Some of the species are very widely diffused; the New Zealand ones numbered 8, 9, 10, are not satisfactorily distinguished.

- Umbels on long peduncles. Fruits on very slender pedicels . . . 1. *H. elongata*.  
 Umbels sessile in the axils of the leaves. Fruits sessile . . . 2. *H. americana*.  
 Umbels more or less peduncled. Fruits nearly sessile, capitate.  
 Leaves tufted. Involucre 2-leaved. Fruits 2 or 3, large . . . 3. *H. asiatica*.  
 Leaves 3-6-partite. Peduncles slender. Umbels 3-6-flowered . . . 4. *H. muscosa*.  
 Leaves 5-7-partite. Peduncles slender. Umbels 40-50-flowered . . . 5. *H. dissecta*.  
 Leaves more or less deeply 5-7-lobed. Peduncles short, slender.  
 Umbels 3-5-flowered. Fruit hispid . . . . . 6. *H. heteromeria*.  
 Peduncles long, slender. Umbels 3-5-flowered. Carpels very flat, broadly winged . . . . . 7. *H. pterocarpa*.  
 Lobes very obscure, obscurely crenate. Peduncles short, slender. Umbels loosely 5-10-flowered . . . . . 8. *H. novæ-Zelandiæ*.  
 Hairy or tomentose. Lobes distinct, toothed. Umbels densely many-flowered . . . . . 9. *H. moschata*.  
 Nearly glabrous, small. Peduncles slender. Umbels many-flowered, very small . . . . . 10. *H. microphylla*.

1. *H. elongata*, *A. Cunn.*;—*Fl. N. Z.* i. 84. Slender, very pilose or almost glabrous; stems 8-10 in. long. Leaves  $\frac{1}{2}$ -1 in. diam., orbicular-reniform, deeply 5-7-lobed, lobes sharply toothed; petioles 1-2 in. long, slender; stipules small. Peduncles very slender, longer than the leaves. Umbels 20-50-flowered. Flowers very minute, on slender strict pedicels,  $\frac{1}{12}$ - $\frac{1}{4}$  in. long. Fruit very small. Carpels with 1 rib on each face, brown.

Wet places in the **Northern** and **Middle** Islands, not uncommon. Very near indeed to the Chilian *H. geranioides*, but that is a much more robust plant.

2. *H. americana*, *Linn.*;—*Fl. N. Z.* i. 82. Perfectly glabrous, slender, creeping, shining. Leaves  $\frac{1}{4}$ - $\frac{1}{2}$  in. diam., orbicular-reniform, 5-7-lobed, lobes shallow crenate; stipules small. Umbels very small, 3-5-flowered, sessile in the axils of the leaves. Flowers sessile. Fruit minute, pale-yellowish. Carpels with 1 rib on each face, glabrous, one often seedless and hispid.

**Northern** Island: marshy ground, not unfrequent. A Canadian, United States, and Brazilian plant, not hitherto found elsewhere in the Old World. The American specimens have sometimes pedicelled flowers.

3. **H. asiatica**, Linn.;—*Fl. N. Z.* i. 82. Stems creeping, rather robust. Leaves fasciated, cordate-oblong or oblong-reniform, obtuse, sinuate-toothed or entire, usually glabrous,  $\frac{1}{4}$ – $1\frac{1}{2}$  in. long; stipules membranous. Umbels 2–3-flowered, on short peduncles. Involucral leaves 2 or 3, large, pilose. Flowers shortly pedicelled. Fruit large, often pilose. Carpels with 2 or 3 stout ribs on each face, reticulated.—*H. cordifolia*, Hook. Ic. Pl. t. 303.

Common in marshy places throughout the islands, *Banks and Solander*, etc. Found also in Australia, Tasmania, and in the warmer parts of Asia, Africa, and America.

4. **H. muscosa**, Br.;—*H. tripartita*, Br.?, *Fl. N. Z.* i. 83. Stems glabrous or pilose, tufted. Leaves  $\frac{1}{4}$  in. diam., 3–5-partite to the base, the lobes obtuse, 2–3-toothed at the tip, coriaceous, stipules rather large. Peduncles shorter than the leaves. Umbels 3–6-flowered. Flowers almost sessile. Fruit glabrous. Carpels rather turgid, with 1 slender rib on each face.

**Northern** Island: swamps at the foot of Tongariro, *Colenso*. **Middle** Island: abundant, *Hector and Buchanan*, etc. Also a native of Tasmania and Southern Australia.

5. **H. dissecta**, Hook. f. *Fl. N. Z.* i. 84. Small, slender, hispid-pilose. Leaves alternate and fasciated, 1 in. diam., cut nearly to the base into 5–7 obovate-cuneate, acute, deeply toothed or laciniate segments, deep green, hairy on both surfaces, teeth rather diverging. Peduncles slender. Umbels very many-flowered. Flowers densely capitate. Fruit small, glabrous. Carpels rather turgid, with 1 obscure rib on each face.

**Northern** Island, *Colenso*. A most distinct species, of which I have very imperfect specimens.

6. **H. heteromeria**, DC.;—*Fl. N. Z.* i. 82. Glabrous or sparsely pilose. Stems very slender. Leaves  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam., reniform with a deep sinus, obtusely crenate and obscurely lobed, shining, membranous; petioles very slender; stipules membranous. Peduncles slender, half the length of the petioles, or shorter. Umbels 3–5-flowered. Flowers very shortly pedicelled. Fruit very small, pale-coloured. Carpels with 1 evident rib on each face, one often hispid.

**Northern** Island: in marshes, Bay of Islands, Auckland, etc. Very near *H. americana*, and perhaps a peduncled form of that plant.

7. **H. pterocarpa**, F. Muell. Perfectly glabrous; stems very long, slender. Leaves 1–2 in. diam., orbicular-reniform with a narrow deep sinus, obscurely broadly crenate-lobed, very membranous; petioles a span long; stipules small, membranous. Peduncles long, slender, shorter than the leaves. Umbels 3–5-flowered. Flowers small, shortly pedicelled. Fruit larger than in any other New Zealand species, very flat. Carpels with 1 rib on each face, glabrous, mottled with brown.—*Fl. Tasm.* i. 153. t. 33.

**Northern** Island, *Colenso*. A native of Tasmania and Victoria, where the peduncles are shorter.

8. **H. novæ-Zelandiæ**, DC.;—*Fl. N. Z.* i. 83. Glabrous or pilose; stems very slender, 5–10 in. long. Leaves  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam., reniform, with usually an open sinus, very obscurely 5–7-lobed, lobes obscurely and obtusely crenate, membranous; petioles slender; stipules rather large. Peduncles slender, much shorter than the leaves. Umbels 5–10-flowered. Flowers very

shortly pedicelled. Fruit glabrous,  $\frac{1}{12}$  in. diam., rather turgid, pale brown. Carpels rounded on the back, with 1 obscure rib on each face.

Abundant throughout the islands in wet places, *Banks and Solander*, etc. Very near the Indian *H. rotundifolia*, Roxb., the Australian *H. vagans*, H. f., and the American *H. Bonplandi*, Rich., but the leaves are less deeply lobed.

9. **H. moschata**, *Forst.*;—*Fl. N. Z.* i. 83. Hispidly pilose tomentose or glabrescent; stems rather slender, tufted, 2–6 in. long. Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., reniform or orbicular with usually an open sinus, 5–7-lobed, generally very distinctly, but never to the middle, lobes acutely toothed, rather coriaceous, and generally hispid on both surfaces; petioles short,  $\frac{1}{2}$ –1 in. long; stipules large, membranous. Peduncles very variable, as long as the petioles or shorter or 0. Umbels few- or many-flowered. Fruit minute,  $\frac{1}{20}$  in. diam., generally crowded, glabrous, turgid. Carpels with 1 rib on each face, acute at the back.

Abundant in moist places throughout the islands, *Banks and Solander*, etc. I suspect the Tasmanian *H. hirta*, Br., to be one form of this, the Tristan d'Acunha *H. capitata*, Thouars, and the Chilean *H. Bonplandi*, Rich., others. In some New Zealand specimens the leaves are scarcely lobed, and the teeth obtuse.

10. **H. microphylla**, *A. Cunn.*;—*Fl. N. Z.* i. 84. Glabrous or sparingly hairy; stems almost filiform, often stout at the very base, 1–4 in. long. Leaves  $\frac{1}{8}$ – $\frac{1}{3}$  in. diam., orbicular-reniform, with a closed sinus, 5–7-lobed, lobes shallow, obtusely 3–4-crenate; petioles  $\frac{1}{4}$ – $\frac{1}{2}$  in. long; stipules rather large. Peduncles as long as or shorter than the petioles, slender. Umbels very small, 3–5-flowered. Flowers almost sessile. Fruit very minute, brown, glabrous,  $\frac{1}{14}$  in. diam. Carpels rather turgid, with an indistinct rib on each face, obtuse at the back.

Not uncommon in moist places, from the Bay of Islands to Nelson, *Travers*; but easily overlooked, from its small size.

## 2. POZOA, Lagasca.

Small herbs, with radical leaves and scapes, or, like *Hydrocotyle*, with creeping stems and fascicled simple or 3–5-foliolate leaves. Umbels simple. Involucral leaves free or connate, forming a toothed or lobed cup. Flowers small, sometimes unisexual.—Calyx 5-toothed. Petals valvate, without inflexed tips. Fruit almost tetragonous, the carpels dorsally compressed rounded flat or concave, more or less evidently 5-ribbed.

A small temperate South American, Tasmanian, and New Zealand genus; the species have often a rank odour when bruised.

- |  |                                  |
|--|----------------------------------|
| Very minute, stemless. Leaves nearly orbicular, obscurely lobed .                            | 1. <i>P. exigua</i> .            |
| Rhizome stout. Leaves orbicular. Stipules ciliate. Fruit shorter than its pedicel . . . . .  | 2. <i>P. Haastii</i> .           |
| Rhizome creeping. Leaves orbicular. Stipules entire. Fruit longer than its pedicel . . . . . | 3. <i>P. reniformis</i> .        |
| Stems creeping, slender. Leaves 3-foliolate. Leaflets petioled . . . . .                     | 4. <i>P. trifoliolata</i> .      |
| Stems creeping, stout. Leaves 3–5-foliolate. Leaflets sessile, coriaceous . . . . .          | 5. <i>P. hydrocotyloloides</i> . |
| Rhizome stout. Leaves 3–5-foliolate. Leaflets sessile, coriaceous . . . . .                  | 6. <i>P. Roughii</i> .           |

1. **P. exigua**, *Hook. f., n. sp.* A very minute plant,  $\frac{1}{2}$ –1 in. high. Rhizome stout; branches 0. Leaves numerous from rhizome, orbicular-ovate

cordate at the base,  $\frac{1}{6}$  in. diam., obscurely 3-5-lobed, coriaceous, glabrous; stipules obsolete; petiole very stout. Scape short, stout; involucreal leaves linear-oblong, connate at the base. Calyx-teeth very unequal. Fruit not seen.

**Middle Island:** Otago, lake district, alpine, *Hector and Buchanan*.

2. **P. Haastii**, *Hook. f., n. sp.* Very variable in size. Rhizome stout or slender, sometimes as thick as the little finger, often sending out creeping suckers, or prostrate leafing and flowering branches 6-10 in. long. Leaves 1-1 $\frac{1}{2}$  in. broad, coriaceous, bright-green and glossy, reniform or orbicular, rounded or deeply lobed at the base; margin almost cartilaginous, crenate-lobed; lobes very broad, shallow; petioles stout, 1-3 in. long; stipules ciliate or lacinate. Umbels many-flowered, rising from the suckers in the axils of shortly petioled, 3-4-lobed leaves, shortly peduncled. Involucreal leaves broadly linear, obtuse, longer than the pedicels. Pedicels  $\frac{1}{4}$  in. long, generally 4 times as long as the shortly oblong fruit.

**Middle Island:** Hopkins river, 4000 ft.; Mount Darwin, Waitaki river, and Hunter river, on shingle, alt. 3500-4500 ft., *Haast*. The leaves vary in being sometimes deeply lobed, at others rounded and not lobed at all at the base.

3. **P. reniformis**, *Hook. f. Fl. Antarct. i. 15. t. 11.* Small, perfectly glabrous, shining, bright green. Rhizome slender, creeping or sending out stolons. Leaves  $\frac{1}{2}$ - $\frac{2}{3}$  in. diam., coriaceous, reniform or orbicular with a rather open sinus, crenate-lobate; petioles stout, 1-2 in. long; stipules acuminate, quite entire. Peduncles shorter than the leaves. Involucreal leaves linear, obtuse, membranous, with a green nerve. Umbels 6-10-flowered. Flowers very small, shortly pedicelled. Fruit glabrous, linear-oblong, longer than its pedicel,  $\frac{1}{8}$  in. long.

**Lord Auckland's group:** in clefts of rocks, *J. D. H.* Very near indeed to *P. Fragosa*, F. Muell., of the Victoria Alps, which has ciliate stipules.

4. **P. trifoliolata**, *Hook. f. Fl. N. Z. i. 85. t. 18.* Very slender, glabrous. Stem 2-6 in. long, filiform, creeping. Leaves 3-foliolate; leaflets with the slender petioles  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, obovate-cuneate, unequally 3-4-lobed; lobes obtuse, apiculate, narrowed into a petiole 1-3 in. long; stipules very obscure, ciliate. Peduncles shorter than the petioles, slender. Umbels 3-6-flowered; involucreal leaves subulate, small, 2-5-fid. Flowers minute, almost sessile; petals acute. Fruit very small,  $\frac{1}{10}$  in. long, dark-brown or pale-yellow. Carpels almost terete at the back.

Var. *β. tripartita*; very small, with a few bristly hairs here and there; leaflets sessile, more coriaceous,  $\frac{1}{4}$  in. long.

**Northern Island:** Totara-nui, *Banks and Solander*; stony and rocky places on the east coast and Ruahine range, *Colenso*. Var. *β.* Crag on Titiokura, *Colenso*.

5. **P. hydrocotylodes**, *Hook. f., n. sp.* Glabrous, stout, tufted. Stems creeping and rooting by stout runners 3-5 in. long. Leaves  $\frac{1}{3}$ - $\frac{2}{3}$  in. diam., orbicular-reniform, coriaceous, 3-5-foliolate; leaflets sessile, broadly obovate-cuneate, 3-5-lobed or -crenate at the tip; petioles  $\frac{1}{2}$ -1 in. long, stout; stipules subulate, entire or ciliate. Peduncles as long as the leaves, solitary from the nodes of the stem, or several at the apex of a leaf-bearing scion. Umbels as in *P. Roughii*, but much smaller.



**Middle** Island: grassy plains, Rangitata river, *Sinclair*; moist ground, near the sources of the Kowai, alt. 2-3000 ft., *Haast*. This approaches the var.  $\beta$  of *P. trifoliolata*, but the whole plant is much more robust and the umbels are many-flowered; it differs from *P. Roughii* in its small size, creeping stems, and habit, but considering how variable alpine plants are, it may prove a var. of it. It is nearly allied to the Falkland Island *P. Ranunculus*, Hook. f. (*Azorella Ranunculus*, D'Urv.).

6. **P. Roughii**, Hook. f., n. sp. Glabrous, coriaceous, shining. Rhizome often as stout as the little finger, crowned with numerous leaves, and with prostrate slender leafy scions bearing umbels and leaves. Leaves  $\frac{3}{4}$  in. diam., orbicular, very coriaceous, 5-foliolate; leaflets sessile, broadly obcuneate, 5-lobed at the end; lobes rounded, obtuse; petioles 1-2 in. long, very stout; stipules lacinate or toothed. Flowering-scions longer than the leaves, bearing 1 sessile and 2 or more peduncled umbels, rising from the axils of small, simple or lobed leaves. Peduncles  $\frac{1}{2}$ - $\frac{3}{4}$  in. long. Umbels many-flowered. Involucres linear, obtuse. Flowers small. Fruit small,  $\frac{1}{12}$  in., twice as long as the slender pedicels. Carpels rounded at the back.

**Middle** Island: mountains, near Nelson, *Rough*. The habit of this is that of *P. Haastii*.

### 3. CRANTZIA, Nuttall.

A small, glabrous, creeping herb. Leaves fascicled, terete, fistular, internally septate, rarely flattened and linear towards the tip. Umbels simple, shortly peduncled. Involucral leaves few, very short. Flowers very minute, pedicelled.—Calyx minutely 5-toothed. Petals not inflexed at the tip. Fruit ovoid-globose. Fruit terete; carpels not contracted at their opposed faces, spongy, each with 5 thick ribs separated by slender furrows.

1. **C. lineata**, Nutt.;—*Fl. N. Z.* i. 87; *Fl. Antarct.* ii. 287. t. 100. Rhizome rank-smelling, as thick as a crowquill, 2-6 in. long. Leaves very variable,  $\frac{1}{2}$ -4 in. long, the tip when expanded to a lamina  $\frac{1}{4}$ - $\frac{1}{6}$  in. broad. Peduncles much shorter than the leaves. Flowers few in an umbel, spreading.

**Northern** and **Middle** Islands: not uncommon in wet, sandy, gravelly, and boggy places. East coast, *Colenso*; Nelson, *Bidwill*. The only species is a native of the United States and Mexico, the Andes of New Granada and Peru, Chili and the Falkland Islands, Tasmania, and Victoria.

### 4. APIUM, Linn.

Erect or prostrate, rank-smelling, glabrous herbs. Leaves alternate or radical and fascicled, 2-pinnate or 3-foliolate. Umbels shortly peduncled or subsessile, simple or compound. Involucres 0.—Calyx-limb 0. Petals broad, with incurved tips. Fruit subglobose. Carpels with 5, slender or thick, spongy ribs, and 1-3 vittæ between each rib, contracted at their contiguous faces.

The genus to which the cultivated Celery belongs. The New Zealand species very closely resemble the European, but differ in the thick, spongy ribs of the carpels; one of them, which is also a native of Fuegia, in the latter country forms an excellent salad and potherb in its wild state.

Branches stout. Leaves pinnate or 2-3-pinnate . . . . .	1. <i>A. australe</i> .
Branches slender. Leaves 3-foliolate . . . . .	2. <i>A. filiforme</i> .

1. **A. australe**, *Thouars*;—*Fl. N. Z.* i. 86. Root stout. Stems prostrate, ascending, rarely erect, branched from the base, grooved, thickness of a sparrow- to a goose-quill, leafy, 6 in.—2 ft. long. Leaves 3–8 in. long, pinnate or 2–3-pinnate; leaflets petioled or sessile, very variable in size, linear obovate or obcuneate, variously lobed or cut, membranous or coriaceous. Umbels usually axillary, compound and sessile, hence appearing like many simple umbels; rays many, 1–2 in. long; partial ones  $\frac{1}{2}$  in. long. Flowers small, white. Fruit ovoid, glabrous,  $\frac{1}{12}$ — $\frac{1}{10}$  in. long.

Var. *a.* Leaflets variously cut, broadly obovate or obcuneate.

Var. *β.* Leaflets cut into narrow linear or lanceolate lobes or leaflets.

Abundant on the shores of all the islands, *Banks and Solander*, etc. A most variable plant, found also in Australia, Tasmania, temperate and cold South America, the Cape of Good Hope, Tristan d'Acunha and St. Paul's Island.

2. **A. filiforme**, *Hook.*;—*Fl. N. Z.* i. 87. Stems prostrate, slender, 6–12 in. long. Leaves 3-foliolate, rarely pinnate; leaflets petioled, obovate or orbicular-cuneate, 3-lobed or variously lobed or cut; petioles 1–2 in. long. Umbels as in *A. australe*, but smaller, sometimes peduncled, sometimes sessile and reduced to one primary ray. Fruit short, with thick spongy ribs, very variable in size.—*Hook. Ic. Pl. t.* 819.

**Northern and Middle Islands**: generally on rocky shores, not uncommon. This is, I expect, a variety of the preceding: also found in the Isle of Pines.

## 5. **ERYNGIUM**, Linn.

Harsh, rigid, generally spinous herbs or shrubs. Umbels small, collected into dense, spiny, involucrate, globose or oblong heads. Involucral leaves spiny, involuclers scattered amongst the flowers. Flowers very minute, sessile.—Calyx-limb of 5, erect lobes; tube covered with scales. Petals deeply lobed, with an inflexed lacinia from between the lobes. Fruit obovoid or subterete, often scaly or tubercled. Fruits nearly terete, without ribs or vittæ.

A large European, Oriental, and South American genus.

1. **E. vesiculosum**, *Labill. Fl. Nov. Holl.* i. 73. *t.* 98;—*Fl. N. Z.* i. 85. A small, rigid, spinous herb, 2–10 in. high. Root stout, crowned with a tuft of leaves and throwing out stout suckers 4–8 in. long, which bear small cuneate toothed leaves at the tip. Leaves tufted, oblong-lanceolate or linear-lanceolate, 3–6 in. long, narrowed into long flat petioles, rarely 1 in. broad, deeply toothed or pinnatifid, the lobes spinescent. Peduncles radical, bearing one small, broadly ovoid head. Involucral leaves 8–10, stellate, rigid, subulate, pungent,  $\frac{1}{4}$ — $\frac{1}{3}$  in. long. Flowers very inconspicuous, mixed with the pungent projecting scales of the involuclers. Calyx densely clothed with imbricating, chaffy, convex scales.

East coast of the **Northern and Middle Islands**, from Auckland to Otago. A native of Tasmania and South Australia.

## 6. **OREOMYRRHIS**, Endlicher.

Silky hairy or nearly glabrous, scapigerous or branched herbs. Leaves pinnate or decom-pound. Umbels simple, solitary on the scapes, with broad,

linear involucreal leaves.—Calyx-limb obsolete. Petals with an incurved tip. Fruit linear or ovate-oblong, somewhat laterally compressed; carpels with 5 rather obtuse ridges, 3 dorsal and 2 lateral.

A small genus, confined to Tasmania, Southern Australia, New Zealand, and the Andes from Mexico to Chili.

Scapes long, radical.	Fruit glabrous . . . . .	1. <i>O. Colensoi</i> .
Scapes long, radical.	Fruit tomentose . . . . .	2. <i>O. Haastii</i> .
Stem branched.	Umbels axillary. Fruit glabrous . . . . .	3. <i>O. ramosa</i> .

1. ***O. Colensoi***, Hook. f. *Fl. N. Z.* i. 92. Very variable in stature, from 2–10 in. high, glabrous or pilose. Leaves numerous, linear-oblong, pinnate or 2-pinnate; leaflets opposite, sessile or petioled,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad, broadly oblong, inciso-serrate or inciso-pinnatifid, turning brown when dry; petioles wiry; sheaths short, membranous. Scapes several, pubescent or woolly, especially upwards, where the hairs point downwards. Involucre of 6–8 ovate leaflets,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long. Flowers small, white, almost sessile in the involucre; pedicels very short, elongating in fruit to 1 in. or less. Fruit quite glabrous.

**Northern** Island: mountainous districts of the east coast and interior, abundant in grassy plains, etc. **Middle** Island: Waimakeriri county, 2500 ft., and Kowai river, *Haast*.

2. ***O. Haastii***, Hook. f., *n. sp.* Very similar to *O. Colensoi*, but more flaccid. Leaves pinnate, with the leaflets more membranous, petioled, broadly ovate, variously lobed or 3-foliate. Fruit linear, densely tomentose; pedicels usually shorter than the involucreal leaves.

**Middle** Island: Mount Darwin, alt. 3200 ft., *Haast*.

3. ***O. ramosa***, Hook. f., *n. sp.* Stem 6–24 in. high, much-branched from the base, and branches very slender, glabrescent or pilose. Leaves pinnate or 2-pinnate, ovate-oblong in outline; leaflets or primary divisions in few pairs, opposite, long petioled,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, ovate, deeply 3–5-lobed or partite or again pinnate, the lobes obtuse, membranous pilose; petioles general and partial very slender. Umbels 6–8-flowered; peduncles axillary, usually shorter than the leaves; involucreal leaves small. Flowers nearly sessile. Fruits unequally pedicelled.  $\frac{1}{8}$ – $\frac{1}{5}$  in. long, very narrow, glabrous.

**Middle** Island: Otago, river flats in the lake district, *Hector and Buchanan*.

## 7. ACIPHYLLA, Forst.

Erect, simple or branched, glabrous, rigid, spinescent, diœcious or polygamous herbs, sometimes tremendously armed throughout with long, rigid, skewer- or sword-like, spinose leaves. Leaves very thick and coriaceous, with sheathing bases, pinnate or 2–3-pinnate, the rhachis jointed at the insertion of the leaflets. Umbels densely fascieled or spicate or paniced; males paniced, on spreading, slender peduncles, oblique; females usually shortly peduncled, in the sheaths of bracteal leaves. Involucres spinescent. Flowers unisexual; males with imperfect ovaries and large depressed stylopodia; females with longer ovaries and erect, tumid stylopodia.—Calyx-tube ovoid or oblong; limb 5-toothed, often unequally, or obsolete. Petals incurved, without an inflexed

tip. Fruit linear or oblong; carpels usually each with 3 dorsal and 2 marginal narrow wings, sometimes 1 carpel is 5- and the other 3-winged.

A very remarkable genus, confined to New Zealand and the Australian Alps, only distinguished from *Ligusticum* by its curious habit and spinescent character.

*Stem 2-9 ft. Female inflorescence much contracted.*

Stem 5-9 ft. Spinous leaflets of bracts slender, the middle one refracted 1. *A. squarrosa*.

Stem 6-9 ft. Spinous leaflets of bracts lanceolate, middle one patent or suberect . . . . . 2. *A. Colensoi*.

Stem 2 ft. Spinous leaflets of bracts erect. . . . . 3. *A. Lyallii*.

*Stem 8-12 in. high. Female inflorescence an open panicle or in globose heads.*

Umbels with slender rays. Involucral leaves linear . . . . . 4. *A. Munroi*.

Umbels densely capitate. Involucral leaves very small . . . . . 5. *A. Dobsoni*.

1. **A. squarrosa**, *Forst.*;—*Fl. N. Z.* i. 87. Tall, unbranched, stout, aromatic, 5-9 ft. high, covered with the very long, spreading, spinous leaflets. Root very stout. Stem 2-4 in. thick below, grooved. Radical leaves 1 ft. or more, pinnate or 2-pinnate; leaflets crowded, a span or more long, very narrow,  $\frac{1}{10}$ – $\frac{1}{2}$  in. across, strict, rigid, pungent, striated, rough to the touch; sheath flattened, 2-3 in. long, terminating in long spines. Inflorescence a dense, oblong, cylindrical panicle, consisting of numerous floral leaves, with small umbels in their axils. Bracts with 3 spinous leaflets, the middle one 4-6 in. long, refracted when the plant is in fruit; the lateral shorter, erect. Umbels shortly peduncled, few-flowered; involucre 0. Flowers diœcious. Calyx-limb obsolete. Fruit  $\frac{1}{3}$  in. long; one carpel 3-, the other 5-winged. with about 3 vittæ in the interstices.—*Forst. Gen. t.* 38; *Hook. Ic. Pl. t.* 607, 608.

Middle and southern parts of the **Northern** Island, and throughout the **Middle** Island, generally below 2000 ft. elevation. The "Wild Spaniard" of settlers, forming a thicket impenetrable to man: it exudes an aromatic gum-resin, and the roots are devoured by pigs.

\* 2. **A. Colensoi**, *Hook. f., n. sp.* Stem 6-9 ft. high, and leaves much larger, broader, and more robust than in *A. squarrosa*. Leaves forming a circle 5-6 ft. diam. of bayonet-like spikes, 2 ft. long, pinnate, or 2-pinnate at the base with only 1 or 2 leaflets to each pinna; leaflets 8-10 in. long,  $\frac{1}{2}$  in. broad, very thick and coriaceous, narrow-linear, acuminate, striate; margins rough or serrulate, cartilaginous; sheath 3 fingers broad, very thick and leathery, terminated on each side above by a short, simple or 3-foliolate leaf. Inflorescence much more lax than in *A. squarrosa*, the bracts broader and shorter; the middle lobe not refracted. Male umbels on branching peduncles 2-4 in. long, which often exceed the bract-sheaths, many-flowered. Flowers and fruit as in *A. squarrosa*, but the wings of the carpels broader.

**Northern** Island: top of Ruahine mountains, *Colenso*. **Middle** Island: Nelson mountains, above 2000 ft., *Bidwill*, *Munro*, etc.; Canterbury, ascending to 5500 ft., *Raoul*, *Haast*, etc.; Otago, *Lindsay*. There are apparently two varieties, one with the leaflets grooved and their edges serrulate or rough, the other with thicker, scarcely striated leaflets, having smooth margins; both are called "Spear-grass" and "Wild Spaniard." *Munro* states that it forms a thicket impenetrable to men and horses. *Siucclair* suspected that this was only a form of *A. squarrosa*, but the wings of the fruit are broader.

3. **A. Lyallii**, *Hook. f., n. sp.* About 2 ft. high, similar in habit and general appearance to *A. Colensoi*, but perfectly smooth, polished, and much smaller. Stem deeply grooved. Leaves simply pinnate or 3-foliolate; leaf-



lets narrow, sword-shaped, rigid, pungent, striate, 4-6 in. long,  $\frac{1}{5}$ - $\frac{1}{3}$  broad, quite smooth. Inflorescence long and contracted, female umbels almost concealed in the tumid sheaths of the bracts; male umbels on spreading, branched, slender peduncles, with subulate involucreal leaves; bracts with 3 suberect leaflets, the middle one sometimes spreading. Fruit small,  $\frac{1}{6}$  in. long, both carpels 5-winged.

**Middle Island:** Dusky Bay, *Lyall*; Rangitata range, Ashburnham glacier, etc., alt. 3-5000 ft., *Sinclair and Haast*; Otago, lake district, alpine, *Hector and Buchanan*.

4. **A. Munroi**, *Hook. f. Fl. N. Z.* ii. 330. Small, rarely 1 ft. high, more flaccid than the preceding, perfectly smooth and shining. Leaves numerous, 3-5 in. long, pinnate, rarely 2-pinnate at the base; leaflets 1-2 in. long,  $\frac{1}{6}$  in. broad, linear, pungent, midrib obscure; sheath linear, with one subulate leaflet on the top on each side. Scape rather slender. Umbels in an open branched panicle, compound. Bracts spreading, with linear sheaths and 1-3 spreading subulate leaflets. Fruit small,  $\frac{1}{6}$  in. long, narrow; carpels some 5-winged, a few 3-winged.

**Middle Island:** Macrac's Run, and other exposed alpine places, alt. 4500 ft., *Munro*; Awatere, *Sinclair*; Discovery Peak, 5800 ft., *Travers*; alps of Canterbury, not uncommon near glaciers, alt. 3000-6500 ft., *Haast*; Otago, lake district, subalpine, *Hector and Buchanan*.

5. **A. Dobsoni**, *Hook. f. n. sp.* Very robust, a span high, perfectly smooth and glabrous, yellow-brown when dry. Leaves (radical) very numerous, consisting of a broad sheath,  $1\frac{1}{2}$ -2 in. long and  $\frac{3}{4}$  in. broad, bearing 3 erect, rigid, very thick, subulate or dagger-shaped, rather concave, jointed leaflets, 1 in. long, and  $\frac{1}{3}$  in. broad at the base, pungent and keeled at the back towards the apex. Flowering-stem as thick as the little finger, terete, striate, bearing at the top 2 small leaves like the radical, and 5 peduncled, densely capitate, globular umbels of fruit. Peduncles unequal,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. long, stout, grooved. Umbels (or heads) 1 in. diam., compound, both peduncles and pedicels very short and thick. Fruits densely packed, mixed with short, subulate, involucreal leaves, linear-oblong,  $\frac{1}{6}$  in. long. Calyx-teeth rather large, unequal. Carpels usually with 5 narrow wings.

**Middle Island:** summit of Mount Dobson, near Lake Tekapo, alt. 7500 ft., *Dobson and Haast*; amongst shingle on the summits of the ranges near Lake Hawea, alt. 6000 ft., *Haast*. A most remarkable plant, of which more specimens are required to make a good specific character.

## 8. **LIGUSTICUM**, Linn.

Glabrous, perennial, erect, often large and robust, aromatic or rank-smelling herbs. Leaves pinnate or decomposed, the rhachis jointed at the insertion of the leaflets. Umbels compound, paniced, polygamous; involucreal leaves few or numerous. Flowers often unisexual, white or pink, females on very short pedicels.—Calyx-teeth oblong; limb obsolete, or of 5 short, often unequal teeth. Petals with an incurved tip. Styles long or short. Fruit elliptic-oblong or linear-oblong; carpels dorsally compressed or rounded, with 5 nearly equal winged ridges, or one with 3 the other with 5 ridges, rarely each with 3 wings.

A genus of temperate Europe, Asia, and America, not hitherto found in South America

nor in Australia, except *Aciphylla* be joined with it, as perhaps it should be. The New Zealand species have ranked under *Anisotome*, in the New Zealand and Antarctic Floras. *Angelica montana* has quite the habit of some of the species, but the broad lateral wings of the carpels keep it distinct. Some forms of *L. aromaticum*, however, approach so near *A. decipiens*, that it is very difficult to distinguish them except by the carpels; and some of the *Ligustica* here described without fruit may be *Angeliceæ*.

*Leaves 2-3-pinnate or decompound.*

- |   |                             |
|---|-----------------------------|
| Very tall and robust. Leaflets decurrent, their lobes pungent . . .                                     | 1. <i>L. latifolium</i> .   |
| Robust, 1 ft. high. Leaflets contracted at base, lobes obtuse . . .                                     | 2. <i>L. intermedium</i> .  |
| Very tall and robust. Leaves decompound; leaflets subulate . . .  | 3. <i>L. antipodium</i> .   |
| Tall, 1½-2 ft. Leaves decompound; leaflets cut into narrow blunt lobes . . .                            | 4. <i>L. Lyallii</i> .      |
| Tall, 1-2 ft. Leaves decompound; leaflets cut into narrow piliferous lobes. Styles slender . . .        | 5. <i>L. Haastii</i> .      |
| Slender, 8-12 in. Leaves 2-pinnate; leaflets cut into narrow piliferous lobes. Styles very minute . . . | 6. <i>L. brevistyle</i> .   |
| Small and very slender. Leaflets few, flaccid, filiform . . .   | 7. <i>L. ? filifolium</i> . |
| Short, stout, fleshy, deformed. Leaves crowded; leaflets subulate . . .                                 | 8. <i>L. ? carnosulum</i> . |

*Leaves pinnate or 3-foliolate (triterminate ? in 12).*

- |  |                                 |
|--|---------------------------------|
| Tall, 1-2 ft., robust. Leaflets broad, lobed or partite, with piliferous lobules . . .   | 9. <i>L. piliferum</i> .        |
| Small, 2-10 in. Leaflets sessile, short, broad, variously toothed or incised . . .       | 10. <i>L. aromaticum</i> .      |
| Very short, densely tufted, much branched. Leaves imbricate. Umbels almost sessile . . . | 11. <i>L. imbricatum</i> .      |
| Small, 4-8 in. Leaflets few, petiolate, rhomboid-orbicular . . .                         | 12. <i>L. ? trifoliolatum</i> . |

1. ***L. latifolium***, Hook. f.—*Anisotome*, Fl. Antarct. i. 16. t. 8. Tall, 3-4 ft. high, very robust and coriaceous. Stem as thick as the wrist at the base. Radical leaves 1-2 ft. long; petiole as thick as the finger; lamina ovate, 2-pinnate; primary divisions linear-oblong; leaflets 2 in. long, 1-1½ broad, obliquely cuneate-oblong, with broad decurrent bases, unequally 3-5-lobed and lobulate; lobules acuminate, with needle-like pungent points, margin thickened, nerves all reticulate. Bracts with very large concave bases, 2-3 in. diam. Umbels very numerous and large, 2-3 in. diam.; involucre leaves of male flower as long as the rays, linear, membranous, 3-4-nerved. Flowers pale-pink. Fruit ⅙ in. long, on pedicels as long, ovoid; carpels with 5 wings, rarely 4 or 3.—*Calosciadium latifolium*, Endl. Gen. Pl. Suppl.

**Lord Auckland's group and Campbell's Island**: in moist places, abundant, J. D. H.

2. ***L. intermedium***, Hook. f.—*Anisotome*, Fl. N. Z. i. 89. Rather stout, 6-12 in. high. Leaves 4-10 in. long, ovate-oblong or linear-oblong, 2-pinnate; primary divisions 6-8 pairs; leaflets ½-1 in. long, short, sessile, cuneate-ovate or triangular-ovate, deeply unequally cut to the middle or below it into broad linear obtuse lobes, coriaceous, veins reticulate; petiole 1-3 in. long, stout, sheath membranous, narrow. Umbels few, subterminal, males 1½-2 in. diam.; rays many; involucre leaves linear-lanceolate. Fruit as in *L. latifolium*, but rather longer, ⅓ in. long.

**Middle Island**: Port Preservation, *Lyall*; on trap cliffs, Shaw's Bay, Otago, *Lindsay*. This approaches *L. Haastii*, but the leaves are less compound, sometimes almost simply pinnate, and the leaflets are cut into broader, blunt lobes. The Otago specimens are less coriaceous and larger than those of Port Preservation, but many more specimens are wanted.

3. ***L. antipodium***, Homb. and Jacq. Voy. t. 3.—*Anisotome*, Fl. Antarct.

i. 17. t. 9 and 10. Stem very robust, 3-4 ft. high, 2-4 in. thick at the base, deeply furrowed. Leaves 1-2 ft. long, oblong, 2-3-pinnate; leaflets excessively numerous, all narrow, linear-subulate, rigid, pungent, 1 in. long,  $\frac{1}{14}$  broad, 1-nerved, all pointing upwards and forwards; rhachis and petiole very stout, as thick as the thumb, with a membranous sheathing base. Male umbels numerous, 2 in. broad, compound, dense; involucreal leaves very narrow. Flowers pink. Fruit  $\frac{1}{2}$  in. long, very narrow-oblong; carpels one 3- the other 5-winged. —*Calosciadium antipodum*, Endl. Gen. Pl. Suppl.

**Lord Auckland's** group and **Campbell's** Island, in marshy places, *J. D. H.*

4. **L. Lyallii**, *Hook. f.*—*Anisotome*, Fl. N. Z. i. 88. Very stout,  $1\frac{1}{2}$ –2 ft. high, purplish, obscurely grooved. Stem 1-2 in. thick. Leaves linear-oblong, 2-3-pinnate; leaflets 8-10 pairs, linear-oblong; pinnules crowded, 1 in. long, obovate-cuneate, cut to the base into linear, obtuse lobes,  $\frac{1}{12}$  in. broad and 1-nerved; petiole as thick as the little finger, with a narrow sheathing base. Fruiting umbels only seen, compound, very many-flowered. Fruit  $\frac{1}{4}$  in. long, longer than its pedicel, linear-oblong.

**Middle Island**: Port Preservation, *Lyall*. A smaller plant than *L. antipodum*, with more flaccid leaves, much shorter and broader obtuse leaflets, and smaller fruit; it looks like a large state of the following.

5. **L. Haastii**, *F. Muell.* Stem rather stout, 1-2 ft. high,  $\frac{1}{2}$  in. thick, grooved, purplish. Leaves  $\frac{1}{2}$ – $1\frac{1}{2}$  ft. long, oblong or ovate-oblong, 2-3-pinnate; leaflets  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, crowded, flaccid, narrow-cuneate, obovate, deeply cut into narrow rather membranous linear lobes,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long,  $\frac{1}{24}$  in. broad, with hair-like points. Umbels numerous, paniced, fruiting 2-3 in. diam.; involucreal leaves filiform; primary rays much larger than the bracts. Fruit ovoid-oblong,  $\frac{1}{6}$  in. long; carpels usually 5-winged; styles slender, spreading.

**Middle Island**: Black Hill, Rangitata range, Ashburnham glacier, and other places in the Southern Alps, alt. 3-5000 ft., *Sinclair and Haast*; Otago, lake district, alpine, *Hector and Buchanan*. Very similar to *L. Lyallii*, but the foliage is much more flaccid, the leaflets cut into much narrower lobes, which are all hair-pointed.

6. **L. brevistyle**, *Hook. f., n. sp.* Stem 8-12 in. high, slender, striate. Leaves 4-6 in. long, linear-oblong in outline, pinnate or 2-pinnate; leaflets  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, flaccid, rather sparse, broadly ovate or oblong in outline, pinnatifid or cleft to the base into few very narrow-linear acuminate acicular-pointed spreading lobes,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long. Umbels few, loosely paniced, fruiting  $1\frac{1}{2}$ –2 in. diam.; involucreal leaves filiform, short; primary rays 1 in. long; secondary shorter than the fruit. Fruit oblong, with narrow ridges,  $\frac{1}{10}$  in. long; calyx-lobes obsolete; style very short.

**Middle Island**: gullies and hillsides, Lake Hawea and Waitaki, alt. 1000 ft. *Haast*; Otago, lake district, *Hector and Buchanan*. Very similar indeed to *L. Haastii*, but much smaller, more slender, and at once distinguished by the small fruit, with narrower ridges and very minute style. Perhaps only a slender, lax form of *L. aromaticum*.

7. **L. (?) filifolium**, *Hook. f., n. sp.* Small, slender, grass-green, 4-12 in. high. Stem slender, as thick as a sparrow's quill, grooved, often much branched above. Leaves on very slender petioles, broad in outline, of a few opposite, very narrow, almost filiform, flaccid flat acute leaflets,  $\frac{1}{10}$ – $\frac{1}{20}$  in. diam.,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, as narrow as the flattened rhachis. Umbels small,

on long slender peduncles; rays slender, very unequal,  $\frac{1}{4}$ –2 in. long; involucreal leaves very short, subulate. Flowers very small, pink. Fruit immature.

**Middle Island:** rocky places, Nelson mountains, *Munro*; Dun mountain, 2400–4000 ft., *Travers*. Various places in the Southern Alps, alt. 2–3000 ft., *Sinclair and Haast*.

8. **L. (?) carnosulum**, *Hook. f., n. sp.* Small, stout, dark-green, fleshy, 4–6 in. high. Stem  $\frac{1}{4}$  in. thick, tortuous amongst shingle. Leaves crowded or whorled about the upper part of the stem, very numerous, often exceeding the umbels, 2–3-ternately divided; leaflets as narrow as the rhachis,  $\frac{1}{14}$ – $\frac{1}{12}$  in. broad,  $\frac{1}{4}$ – $\frac{3}{8}$  in. long, curved, subacute, fleshy, indistinctly articulate with the rhachis; petiole 1–2 in. long, stout and fleshy, scarcely sheathing at the base. Umbels small,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., compound, on very thick peduncles which are crowded amongst the leaves, involucreal leaves like the cauline, exceeding the peduncles. Flowers very small, pinkish (males only seen). Fruit unknown.

**Middle Island:** shingly places on Mount Torlesse, alt. 6–7000 ft., *Haast*. A most singular plant, quite unlike any other in New Zealand: its tortuous stem, leafy at the top only, and fleshy habit are both indicative of its habitat amongst loose dry shingle.

9. **L. piliferum**, *Hook. f., n. sp.* Erect, robust, very coriaceous. Stem 12–20 in. high,  $\frac{1}{2}$  in. thick, branched above, striated, red-purple. Leaves a span to a foot long, linear, pinnate; leaflets 10–12 pairs,  $\frac{1}{2}$ –1 in. long, broadly deltoid, ovate or orbicular-ovate, sessile, often imbricating, very coriaceous, 2–3-lobed to the base or subpinnatifid, the margin lobulate; lobules ending in a bristle; petiole and rhachis very stout, as thick as a goose-quill; sheath narrow, membranous. Umbels on stout branches; rays 1–1 $\frac{1}{2}$  in. long; involucreal leaves very numerous, linear or linear-lanceolate, membranous. Flowers white; styles slender. Fruit  $\frac{1}{6}$  in. long; carpels 3-winged, polished.

Var.  $\alpha$ . Leaflets very broad and coriaceous, 3-lobed to the base or ternate, closely imbricating.

Var.  $\beta$ . Leaflets longer, pinnatifidly cut into narrower lobes.

**Middle Island:** var.  $\alpha$ . Harumiri mountains, alt. 4500–6000 ft., *Travers*; Mount Torlesse, 4700 ft., and Hopkins river by running water, 3–5000 ft., *Haast*; Otago, lake district, alpine, *Hector and Buchanan*. Var.  $\beta$ . Great Clyde glacier, 3800–4000 ft., Mount Darwin and Lake Tekapo, *Haast*.

10. **L. aromaticum**, *Banks and Sol.*—*Anisotome*, Fl. N. Z. i 99. Small, 2–10 in. high, sometimes in alpine places tufted matted and depressed, bright green, shining, very aromatic. Roots often large and stout; stem sparingly branched above,  $\frac{1}{8}$  in. thick. Leaves numerous, spreading, 1–6 in. long, linear, pinnate; leaflets 8–12 pairs,  $\frac{1}{6}$ – $\frac{1}{3}$  in. long, sessile, deltoid-ovate or orbicular, more or less toothed and cut, sometimes to the base into separate leaflets, or rarely pinnate, the teeth and lobes usually piliferous, very coriaceous, reticulated closely with veins; petiole very stout, with a rather broad, short, membranous sheath. Umbels small, 1–1 $\frac{1}{2}$  in. diam.; rays slender; involucreal leaves few, linear-subulate. Flowers white; styles slender. Fruit linear-oblong,  $\frac{1}{6}$  in. long; carpels equally 5-winged.

Mountainous regions in the **Northern** and **Middle** Islands, alt. 4–6500 ft., very common, *Banks and Solander*, etc. Foliage very variable indeed, the leaflets being entire and



toothed, or more or less deeply cut into lobes till they are almost again pinnate, with narrow segments.

11. *L. imbricatum*, *Hook. f., n. sp.* Stems most densely tufted, forming large, flat, depressed patches, very much branched, as thick as the little finger, densely covered with closely imbricating, persistent, coriaceous, shining, green leaves. Leaves with the sheaths  $\frac{1}{2}$  in. long; petiole and rhachis very stout; leaflets 4-6 pairs, very small, closely imbricate,  $\frac{1}{12}$ — $\frac{1}{8}$  in. long and broad, palmately 3-5-lobed; lobes terminated by a stout bristle; sheaths very large, broad, membranous, produced upwards into a large hood. Flowering-stem sunk amongst the leaves. Umbel compound, male only seen. Involucral leaves few, oblong, obtuse. Calyx-teeth large, acute.

**Middle Island:** Otago, dry debris on the alps of the lake district, alt. 5-6000 ft. A highly curious plant, very unlike an Umbelliferous one; but I suspect only a form or state of *L. aromaticum*.

12. *L. (?) trifoliolatum*, *Hook. f., n. sp.* Small, glabrous. Stem slender, 6 in. high, sparingly divided above. Leaves 3-foliolate or pinnate; leaflets in 1 or 2 distant pairs,  $1\frac{1}{2}$  in. long, on slender petioles, rhombic-orbicular, cuneate at the base, the rounded tip crenate, glaucous below, reticulated with veins, lowermost sometimes lobed or 3-fid; petioles slender, sheaths short, broad. Umbels small, few-flowered; rays short or long, unequal, slender; involucral leaves very short. Flowers white; styles slender. Fruit unknown.

**Middle Island:** watercourses by the Kowai river, alt. 2-3000 ft., *Haast*. A curious little species, at once known by the few petioled leaflets; it is probably 2-pinnate, or 2-ternately pinnate. I have only two specimens, and, in the absence of fruit, am not certain of its genus.

I have another small, pinnate-leaved species of this genus?, somewhat similar to *L. aromaticum*, gathered in the **Southern** Island by Dr. Lyall, but not in flower or fruit, with small orbicular crenate leaflets, and the upper part of the rhizome sheathed with the rigid bases of the old petioles.

## 9. ANGELICA, Linn.

Erect herbs or subscandent undershrubs. Leaves pinnate or 2- or 3-pinnate. Umbels compound, often polygamous.—Calyx-limb 5-toothed, often unequally, or obsolete. Petals with an incurved or rarely inflexed tip. Styles generally long and slender. Fruit oblong, more or less cordate at the base; carpels much dorsally compressed, with 3 slender filiform dorsal ribs, and 2 broad lateral membranous wings.

A small genus, of temperate Europe, Asia, and America, hitherto found nowhere in the southern hemisphere, except in New Zealand, where the two subscandent species are anomalous in the Order, and the erect ones are in many characters more closely allied to *Ligusticum* than to *Angelica*.

Herbaceous, stem erect.	Leaves radical, pinnate; leaflets crenate . . .	1. <i>A. Gingidium</i> .
Herbaceous, stem erect.	Leaves radical, pinnate; leaflets lacinate . . .	2. <i>A. decipiens</i> .
Suffrutescent, subscandent.	Leaves on the branches, pinnate . . .	3. <i>A. roseifolia</i> .
Suffrutescent, subscandent.	Leaves on the branches, 1-3-foliolate . . .	4. <i>A. geniculata</i> .

1. *A. Gingidium*, *Hook. f.*;—*Anisotome*, Fl. N. Z. i. 89. Stem stout, erect,  $1-1\frac{1}{2}$  ft. high, striate, branched sparingly above. Leaves 4-10 in.

long, pinnate; leaflets 4-8 pairs, sessile, 1-2 in. long, broadly obliquely ovate-oblong, obtuse, crenate, sometimes obscurely lobed on one side, closely reticulated, glaucous below; petioles stout, rhachis jointed at the insertion of the leaflets; sheath narrow. Umbels compound, 1-3 in. diam., polygamous; rays slender; involucreal leaves very variable, long or short. Flowers white. Fruit  $\frac{1}{6}$  in. long, ovate-oblong.

Var. *β*. Leaflets more membranous, deeply inciso-serrate.

**Northern** Island: moist grassy plains, Wairarapa valley, *Colenso*. More frequent in the Nelson and Canterbury provinces of the **Middle** Island. Otago, lake district, *Hector* and *Buchanan*.

2. **A. decipiens**, *Hook. f., n. sp.* Root stout, sometimes very thick. Stem 6-8 in. high. Leaves numerous, most or all radical, spreading, 4-6 in. long, linear, pinnate; rhachis stout, jointed at the leaflets; leaflets 6-10 pairs, ovate-oblong, sessile,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long and broad, flaccid, irregularly pinnatifid; lobes linear, acute, not awned, 1-nerved. Stems or peduncles not longer than the leaves, rather slender, striate, usually unbranched. Umbels 1-1 $\frac{1}{2}$  in. broad; involucreal leaves rather membranous; primary rays  $\frac{1}{2}$ -1 in. long, secondary  $\frac{1}{8}$  in. Flowers minute. Fruit ovate-oblong,  $\frac{1}{10}$  in. long, rounded or cordate at the base, lateral wings coriaceous, calyx-lobes distinct; styles long, recurved.

**Middle** Island: Terraces near Lake Okau, Mount Cook, Rangitata range, and Black Birch Creek, alt. 2-5000 ft., *Sinclair, Haast*.

3. **A. rosæfolia**, *Hook.*—*Anisotome*, Fl. N. Z. i. 90. Stem branched, subscandent, or trailing over rocks, etc., several feet long, woody, as thick as a goose-quill, branches leafy at the top, below often covered with persistent leaf-sheaths. Leaves 2-4 in. long, pinnate; leaflets 1-1 $\frac{1}{2}$  in. long, sessile, obliquely ovate-oblong or lanceolate, acute, serrate, coriaceous, with evident midrib and reticulating veins; petiole slender, rigid; sheath bilobed at the top. Umbels terminal, peduncled, very compound; involucreal leaves linear-subulate, shorter than the slender rays. Flowers small, white. Fruit  $\frac{1}{10}$  in. long, ovate-cordate, with broad white lateral wings.—*Hook. Ic. Pl. t. 581*.

**Northern** Island: East Cape, *Sinclair, Colenso*; Great Barrier Island, *Lyall*; Tonga-riro, *Bidwill*. **Middle** Island: Akaroa, *Raoul*.

4. **A. geniculata**, *Hook. f.*—*Anisotome*, Fl. N. Z. i. 90. t. 19. Weak, suffruticose, much branched; branches slender, flexuose, divaricating, forming tangled masses over rocks and shrubs, internodes 2-3 in. long. Leaves small, alternate, 1-foliolate (young 3-foliolate); leaflets  $\frac{1}{4}$ - $\frac{1}{3}$  in. diam., broadly orbicular-ovate, or transversely oblong, rarely oblong or reniform, obscurely crenate, glaucous below, with radiating finely reticulate veins; petiole slender,  $\frac{1}{4}$  in. long, with a very small bilobed sheath. Umbels small, terminal, shortly peduncled; rays few, slender, longer than the short involucreal leaves. Flowers small, white; petals with an inflexed tip. Fruit  $\frac{1}{5}$  in. long, broadly ovoid, cordate at the base; lateral wings broad, white, membranous.

**Northern** Island: east coast, *Colenso*. **Middle** Island: common in the Canterbury and Otago provinces.

## 10. DAUCUS, Linn.

Erect, branching, often hispid herbs. Leaves decom-pound. Umbels com-

pound.—Calyx-limb obscurely 5-toothed. Petals with an inflexed tip. Fruit oblong, dorsally rather compressed; carpels each with 5 primary and 4 secondary ridges, both covered with hispid short hairs, or with stout bristles.

A considerable genus in temperate Europe and Asia, rarer in America and in the southern hemisphere. The Carrot, *D. Carota*, has been gathered at the Bay of Islands, doubtless introduced (*A. Gray*).

1. **D. brachiatus**, *Sieber*;—*Fl. N. Z.* i. 91. Pilose or glabrate, 6–12 in. high. Leaves 2-pinnatisect; leaflets incised, the ultimate divisions linear. Umbels axillary and terminal, of 8–10 unequal rays; involucre leaves simple or compound. Flowers small, red. Fruit  $\frac{1}{2}$  in. long, larger ridges with a row of stiff barbed bristles, intermediate ones much smaller, with a double row of bristles pointing right and left.—*Scandix glochidiata*, *Labill. Fl. N. Holl.* t. 102.

**Northern and Middle Islands**: not uncommon in dry grassy pastures from Auckland to Otago, *Banks and Solander*, etc. Abundant in Australia, Tasmania, and Western America, from Mexico to Chili.

## ORDER XXXIV. ARALIACEÆ.

Trees, rarely herbs. Leaves alternate (rarely opposite), simple or compound, usually evergreen, glossy, stipulate or exstipulate. Flowers in umbels, less commonly in panicles racemes or heads, often unisexual.—Calyx-tube adnate to the ovary, limb truncate or 5-, rarely 3- or many-toothed or lobed; lobes persistent in fruit. Petals usually 5, rarely 0, coriaceous, valvate, rarely imbricate, deciduous. Stamens inserted round an epigynous disk, usually 5; filaments incurved, subulate; anthers oblong. Ovary 2- or more celled; styles short, subulate, recurved, stigmatiferous on their inner faces; ovule pendulous in each cell. Fruit succulent or coriaceous, flattened angled or terete, 2- or many-celled, cells cartilaginous, 1-seeded. Seed flattened, testa very thin; albumen copious, fleshy or horny; embryo small.

A large tropical Natural Order, to which the Ivy belongs, but rare in the north temperate zone, chiefly distinguished from *Umbelliferae* by the arboreous habit, evergreen foliage, often many-celled ovary, and fruit never splitting into its component carpels. Some tropical species have anomalous characters, not introduced into the above ordinal character, as 1-celled ovaries and coherent petals.

Herbaceous. Pedicel jointed with flower. Petals imbricate . . .	1. STILBOCARPA.
Trees or shrubs. Pedicel jointed with flower. Petals valvate . . .	2. PANAX.
Tree. Pedicel not jointed with flower. Petals valvate . . .	3. SCHEFFLERA.
Tree. Pedicel not jointed with flower. Petals 0 . . .	4. MERYTA.

### 1. STILBOCARPA, Decaisne and Planchon.

A large, much branched, stout, fleshy herb. Stem fistulose, usually beset with large soft bristles or stout hairs. Leaves orbicular, entire, with foliaceous stipular sheaths. Umbels polygamous, compound, subglobose, with foliaceous involucre.—Flowers jointed on the top of the pedicel. Calyx-tube 3- or 4-grooved, limb entire. Petals 5, obovate-oblong, imbricate. Male fl.: stamens 5; style 0; lobes of disk flat. Female: stamens as in the male or 0; lobes of disk 3 or 4, subreniform, surrounding a cavity in the axis of the ovary; styles 3 or 4, subulate, recurved. Ovary broadly turbinate, 3- or 4-celled. Fruit

globose, axis hollow, 3- or 4-furrowed, corky, covered with a brilliant black shining epidermis, containing 3 or 4 horny nuts.

The only species of the genus, and a most remarkable plant, allied to the Chinese and Himalayan herbaceous *Aralias*.

1. **S. polaris**, *Decne. and Planch.*;—*Aralia polaris*, Fl. N. Z. i. 95. Stems 2-4 ft. high, from a long, annulate, thick, prostrate rhizome, much branched, 1-2 in. diam., grooved, succulent, of a rank odour when bruised. Leaves 1-1½ ft. broad, almost fleshy, orbicular-reniform, many-lobed and -toothed, bristly on both surfaces, veins flabellate; petiole erect, semiterete, 2 ft. long; sheaths semiamplexicaul, produced upwards into a foliaceous, truncate, lacinate ligule. Umbels terminal and axillary, compound, as large as the human head, composed of myriads of yellowish waxy flowers, with a purple disk; involucre leaves various, lower foliaceous. Flowers  $\frac{1}{6}$ — $\frac{1}{4}$  in. diam., on short clavate pedicels. Fruit size of a small peppercorn, black, brilliant.—*Aralia polaris*, Fl. Antarct. i. 21; Hook. Ic. Pl. t. 747.

**Southern Island**, *Lyall*. Abundant in **Lord Auckland's** group and **Campbell Island**, *J. D. H.* Covering large tracks of ground with huge orbicular masses, very conspicuous from the yellowish waxy flowers and black shining fruit. *Lyall's* Southern Island specimen wants the long bristles, and may belong to another species.

## 2. PANAX, Linn.

Trees or shrubs. Leaves evergreen, 1-7-foliolate, rarely simple; stipules 0, or sheathing or subulate. Umbels simple or compound.—Flowers polygamous, jointed on the summit of the pedicel. Calyx-limb toothed sinuate or entire. Petals 5, valvate. Stamens 5. Ovary 2-5-celled, with 2-5 short recurved styles, sometimes connate at the base. Fruit coriaceous or fleshy, 2-5-celled.

I have adopted the character of *Panax* from the observations of *Decaisne* and *Planchon*, in their classification of the Order in the 'Revue Horticole,' 1854, p. 105. The genus, as thus defined, is a very considerable one, and found in many parts of the world.

Leaves in old plants simple or 1-foliolate, in young usually 3-5-foliolate.

- |  |                             |
|--|-----------------------------|
| Stipules 0. Leaflet lanceolate, serrate. Styles 2 . . . . .                              | 1. <i>P. simplex</i> .      |
| Stipules 0. Leaflet oblong, quite entire. Styles 3 or 4 . . . . .                        | 2. <i>P. Edgerleyi</i> .    |
| Stipules minute. Leaflet small, rounded. Umbels minute. Styles 2. . . . .                | 3. <i>P. anomalum</i> .     |
| Stipules subulate. Leaves 2 in., very coriaceous, linear. Styles 3 or 4 . . . . .        | 4. <i>P. lineare</i> .      |
| Stipules 0. Leaves linear, 3-10 in., very coriaceous, green, toothed. Styles 5 . . . . . | 5. <i>P. crassifolium</i> . |
| Stipules 0. Leaves 4-12 in., very narrow, purple below, always simple, toothed . . . . . | 6. <i>P. longissimum</i> .  |

Leaves in old plants 3-5-foliolate.

- |  |                            |
|--|----------------------------|
| Stipules 0. Leaflets sessile. Styles 5 . . . . .           | 7. <i>P. Lessonii</i> .    |
| Stipules sheathing. Leaflets sessile. Styles 2 . . . . .   | 8. <i>P. Colensoi</i> .    |
| Stipules sheathing. Leaflets petiolate. Styles 2 . . . . . | 9. <i>P. arboreum</i> .    |
| Stipules 0. Leaflets sessile. Styles 2 . . . . .           | 10. <i>P. Sinclairii</i> . |

1. **P. simplex**, *Forst.*;—*Fl. N. Z.* i. 93. A small evergreen glossy tree, 12-20 ft. high. Leaves with slender petioles 1-3 in. long, coriaceous, very glossy, young 3-5-foliolate, older 1-foliolate; leaflets 2-4 in. long, oblong- or obovate-lanceolate, subacute or acuminate, coarsely serrate, rarely entire, in young plants deeply sinuate-pinnatifid; stipules 0. Umbels small, axillary and terminal, on peduncles shorter than the leaves, partial 10-15-



flowered, rays  $\frac{1}{4}$ – $\frac{1}{3}$  in. Flower small, greenish-white. Ovary compressed, 2-celled. Styles small, free, recurved. Fruit  $\frac{1}{8}$  in. diam., broadly urceolate.—Fl. Antarct. i. 18. t. 12.

**Northern Island**: mountains of the interior; Tongariro, *Colenso*; abundant throughout the **Middle Island** at 2–4000 ft. elevation, and in **Lord Auckland's** group, *J. D. H.* A very variable plant in the size and serration of the leaflets, which are obtuse acute or acuminate and sometimes opposite. In **Lord Auckland's** group I collected young plants 4 in. high, with unifoliate, coriaceous leaves, but both Bidwill and Hector sent as the foliage of young plants 5-foliate leaves, the leaflets membranous and sinuate pinnatifid.

2. **P. Edgerleyi**, *Hook. f. Fl. N. Z.* i. 94. A small tree, 20–40 ft. Leaves on long (2–3 in.) slender petioles, rather membranous, very glossy; leaflet 2–9 in. long, obovate- or oblong- or linear-lanceolate, acuminate, quite entire, in young plants 3-foliate, leaflets deeply pinnatifid; stipules 0. Umbels as in *P. simplex*, but ovary 3- or 4-celled, and the styles connate at the base.

**Northern Island**: mountainous regions of the interior, *Edgerley, Colenso*. **Middle Island**: Nelson mountains, *Bidwill*; Otago, *Hector*.

3. **P. anomalum**, *Hook. Lond. Journ. Bot.* ii. 422. t. 12;—*Fl. N. Z.* i. 93. A small tree or shrub, with divaricating woody branches, rough with minute hispid hairs. Leaves very shortly petioled, 1-foliate; leaflet oblong orbicular or obovate, rounded at the tip, obscurely crenate, rather membranous, not glossy; petiole flattened,  $\frac{1}{12}$  in. long, pubescent, with minute subulate stipules at its base, and stipes at its tip. Umbels minute, axillary, simple, very shortly peduncled, 1–4-flowered. Flowers very minute, green, shortly pedicelled. Fruit  $\frac{1}{8}$  in. diam., 2-celled, with free recurved styles, white mottled with brown.

**Northern Island**: pine swamps, Bay of Islands, and elsewhere not unfrequent. **Middle Island**: Nelson, *Bidwill*. A very anomalous species, in habit resembling *Melicope simplex* and *Elæodendron micranthum*.

4. **P. lineare**, *Hook. f. Fl. N. Z.* i. 93. A small tree (?); branches stout, woody. Leaves mixed with trifid coriaceous scales, patent, simple, not jointed on the extremely short petiole, 2–3 in. long,  $\frac{1}{3}$ – $\frac{1}{2}$  wide, minutely serrate, obtuse or acute, excessively coriaceous, with thickened margins, not glossy; petiole  $\frac{1}{8}$  in. long, stout; stipule small, subulate. Umbels almost sessile amongst the upper leaves, of 4 or 5 short stout bracteolate rays. Fruit ovoid, 3- or 4-celled; styles connate into a cone, their summits free, recurved.

**Middle Island**: Chalky Bay, *Lyall*. I have only two small specimens of this curious species.

5. **P. crassifolium**, *Dene. and Planch.*—*Aralia crassifolia*, Banks and Sol.; *Fl. N. Z.* i. 97. A slender, sparingly branched, glabrous tree, bark green. Leaves extremely variable, in young plants 3-foliate; leaflets very narrow-linear,  $\frac{1}{3}$ – $\frac{2}{3}$  in. broad, of the upper leaves broader,  $\frac{2}{3}$ –1 in., deeply remotely sinuate-serrate, serratures cuspidate; in older plants, simple, narrow, linear-obovate or linear, quite entire or sinuate or coarsely acutely serrate at the broader part beyond the middle, extremely coriaceous, narrowed into a short, stout, exstipulate petiole of variable length; veins numerous, divergent. Umbels unisexual, terminal, compound, of several very spreading rays; peduncles and rays 1–3 in. long; pedicels short, of the male flowers subrace-

mose. Flowers rather large. Fruit subglobose, as large as a pea, 5-celled, the 5 styles connate into a cone, with their summits free and recurved.—Hook. Ic. Pl. t. 583-4.

Common in forests throughout the islands, *Banks and Solander*, etc. **Chatham Islands**, *Dieffenbach*. A very puzzling plant; the lower and younger leaves are always 3-foliolate, the upper 1-foliolate or simple, all excessively coriaceous. For notes on some supposed varieties of this, see end of genus.

6. **P. longissimum**, *Hook. f., n. sp.* Stem forming a straight, slender, erect, simple rod, 4-10 ft. high; bark dark-green, striped with brown. Leaves all uniform, quite simple, 6-18 in. long,  $\frac{1}{4}$ - $\frac{3}{4}$  in. broad, spreading or drooping, excessively stiff, coriaceous, coarsely regularly or irregularly toothed, dirty-purple below, very deep-green above, with often a light-green spot at the base of each tooth; petiole very short, exstipulate, not jointed with the blade; midrib very thick; veins 0.

Throughout the islands, *Banks and Solander*, etc., from the Bay of Islands to Otago. This remarkable plant has been for fifteen years in cultivation at Kew (as a state of *P. crassifolium*), and never changes its habit; it has been collected by Banks, and many succeeding travellers, but no one has identified any flower or fruit with it. I have, however, in the Herbarium male flowers and leaves of a *Panax* closely resembling *P. crassifolium*, differing chiefly from that plant in the less coriaceous, more acute leaves, with more regular serratures, that may prove to belong to this.

7. **P. Lessonii**, *DC.*—*Aralia Lessonii*, Fl. N. Z. i. 96. A small, glabrous tree, branches very stout. Leaves in old plants 3-5-foliolate; leaflets 1-4 in. long, sessile, oblong- or obovate-lanceolate, subacute, more or less sinuate-serrated or quite entire, very thick and coriaceous, not shining; nerves very indistinct; petiole 4-8 in. long, stout or slender, neither sheathing nor stipulate at the base. Umbels branched, on long stout peduncles; pedicels racemose, unisexual. Flowers rather large. Fruit ovoid,  $\frac{1}{4}$  in. long, 5-celled, with 5 styles connate into a cone, and very short, recurved tips.

**Northern Island**: east coast, *Cunningham*; Auckland, *Sinclair*. **Middle Island**: Bream Bay, *D'Urville*.

8. **P. Colensoi**, *Hook. f. Fl. N. Z. i. 94. t. 21.* A small tree; branches stout. Leaves glossy, on long petioles, 3-5-foliolate; leaflets 4-6 in. long, very coriaceous, sessile or very shortly petioled, obovate- or oblong-lanceolate, coarsely serrated, veins very indistinct; petiole stout, 6-10 in. long, with a short 2-lobed coriaceous sheath. Umbels compound, terminal; primary rays long, stout, divaricating, in the largest specimens 2-3 in.; secondary rays 1 in., pedicels short. Calyx-limb truncate or sinuate. Fruit flattened, nearly orbicular, 2-celled, with 2 divergent styles.

**Northern Island**: Ruahine Mountains and Tararua, *Colenso*. **Middle Island**: Otago, *Lindsay, Hector*. **Southern Island**: *Herb. A. Richard*. Ivy-tree of Otago. Colenso sends as a young state of this, a plant with pinnatifid leaflets, which perhaps belongs to *P. Sinclairii*, for both Lindsay and Hector observe that the leaves are 3-5-foliolate in all stages, and never sinuate or lobed. Wood useless, trunk exuding large quantities of gum, *Buchanan*. Hector observes that it is the *Aralia trifolia* of Sydney Garden.

9. **P. arboreum**, *Forst.*;—*Fl. N. Z. i. 94.* A robust, leafy, glossy tree, 12-20 ft. high; branches stout. Leaves on long petioles, 5-7-foliolate; leaflets with petioles  $\frac{1}{2}$ -1 in. long, very coriaceous, 4-6 in. long, broadly or narrowly oblong or obovate-oblong, subacute, sinuate-serrate; veins distinct;

petiole 2-8 in. long, robust, with a short, broad, coriaceous, 2-lobed sheath. Umbels unisexual, terminal, very numerous, large; peduncles 2-3 in. long, spreading; rays very numerous, 1 in. long; pedicels  $\frac{1}{4}$  in. Flowers large. Calyx-margin sinuate. Fruit nearly orbicular, flattened, grooved on the faces, with 2 short recurved styles, connate to the middle.—Hook. Lond. Journ. Bot. ii. 421. t. 11.

Common in forests throughout the islands, *Banks and Solander*, etc. **Kermadec** Islands, *M'Gillivray*.

10. **P. Sinclairii**, *Hook. f., n. sp.* A small tree. Leaves on rather short petioles, 3-5-foliolate; leaflets sessile, 1-2 in. long, very coriaceous, not glossy, obovate- or oblong-lanceolate, acute, sharply serrate, veins obscure; petiole 1-1 $\frac{1}{2}$  in. long, neither stipulate nor sheathing. Umbels small, unisexual, on short, terminal peduncles  $\frac{1}{2}$ -1 in. long or less; rays few; pedicels very short. Fruit nearly orbicular, compressed, 2-celled, with 2 short recurved styles.

**Northern** Island: Ruahine Mountains, etc., *Colenso*. Auckland?, *Herb. Sinclair*. Sinclair sends both old specimens with normal 5-7-foliolate serrate leaflets, and young ones with pinnatifid leaflets; Colenso sends the pinnatifid-leaved state as the young of *P. Colensoi*.

There are two species of *Panax* mentioned as natives of New Zealand, in Planchon's 'Hortus Donatensis' (p. 10), and which, being founded on garden specimens that have never flowered, are very doubtful; these are *P. pentadactylum*, Dene. and Pl., from New Zealand? (*A. pentaphylla*, Hort., *A. quinquevulnera*, Makoy), which Planchon suspects is a variety of *P. crassifolium*, with green not brown leaves, 5- rarely 3-foliolate, and the leaflets elegantly curved instead of being stiff and straight as in *P. crassifolium* and *tridactylum*. The other is *P. tridactylum*, Dene. and Pl. (*A. triphylla* and *A. trifoliata*, Hort.), of which he says that this also is perhaps a variety of *P. crassifolium*, sometimes bearing only one leaflet, whilst the leaflets of *P. crassifolium* become ternate, especially towards the upper part of large trees. Professor Planchon is, however, in some misconception here, for the true *P. crassifolium* is green and not brown, both in a native state and cultivated, and has 3-foliolate leaves, except only at the tops of the older branches, where they become 1-foliolate and (losing their joint) simple.

### 3. SCHEFFLERA, Forst.

Trees. Leaves digitately 7-foliolate. Umbels racemed.—Flowers polygamous, not jointed on the top of the pedicel. Calyx-tube minutely 5-toothed. Petals 5, valvate. Stamens 5. Ovary 10-celled, with 10 short styles united into a cone to above the middle, their tips free. Fruit rather fleshy, 10-celled, 10-ribbed.

I do not find that this old genus of Forster's is retained in the rearrangement of the Order by Decaisne and Planchon, who, however, I cannot suppose would leave it in *Panax*, from which it differs in habit, inflorescence, the 10-celled ovary, and the absence of any evident joint at the summit of the pedicel with the flower, whilst it differs still further from *Aralia* in the valvate petals, digitate leaves with regular serratures, and 10 styles.

1. **S. digitata**, *Forst.*—*Aralia Schefflera*, Spr.;—Fl. N. Z. i. 95. A small umbrageous tree or large shrub, with stout branches. Leaves on long petioles, digitately 7-11-foliolate; leaflets petiolate, 4-7 in. long, oblong-lanceolate, acuminate, membranous, sharply finely serrate; veins diverging, delicate; petiole 3-7 in. long, terete, with a short 2-lobed sheath at the base. Umbels racemose on the branches of a very large, unisexual, compound, axillary panicle, small,  $\frac{1}{4}$ - $\frac{1}{2}$  in. diam., many-flowered; rhachis of panicle 1 ft. and

more, branches diverging, a span long, peduncles of umbels  $\frac{1}{2}$  in., pedicels  $\frac{1}{4}$  in. Flowers rather small. Fruit nearly globose,  $\frac{1}{10}$  in. diam., black, pulpy, deeply furrowed when dry.

Common throughout the island in forest regions, *Banks and Solander*, etc.

#### 4. **MERYTA**, Forst.

Small trees; trunk slender, erect, sparingly branched; branches terminated by a crown of very large leaves.—Flowers in terminal, involucre, panicle heads, polygamous. *Male*: Calyx 3–5-lobed, lobes valvate?. Petals 0. Stamens 3–5, inserted beneath a glandular disk. Ovary 0. *Female*: Calyx-limb 5–9-partite, lobes valvate. Petals 0. Ovary 5–9-celled, with as many short stigmas united below, free and recurved above. Berry ovoid or oblong, 5–9-celled. Embryo terete, curved, with small, flattened cotyledons.

A small genus of singular-looking trees, natives of the Pacific Islands, one of which Dr. Seemann (in *Herb. Hook.*) has rightly referred to the imperfectly-known genus *Meryta* of Forster.

1. **M. Sinclairii**, *Hook. f.*—*Botryodendrum*, Fl. N. Z. i. 97. Leaf on a long petiole, very coriaceous, shining, 5–20 in. long, oblong or obovate-oblong, sometimes contracted below the middle, cordate at the base, margin quite entire or waved, strongly veined; petiole 3–10 in. long, stout, very obscurely if at all jointed with the blade. Panicles terminal, branched, erect, very stout, 6–8 in. long. Flowers not seen. Fruit oblong,  $\frac{1}{2}$  in. long, 5-celled.

**Northern** Island: east coast, between Capes Rodney and Brett, *Sinclair and Colenso*. The fruits are quite separate, and do not appear as if they had belonged to a capitate inflorescence, but my specimens are very imperfect. I described the petiole as jointed with the blade, in Fl. N. Z., I believe erroneously.

### ORDER XXXV. CORNEÆ.

Shrubs or trees, rarely herbs. Leaves alternate, entire, exstipulate. Flowers regular, hermaphrodite or unisexual, usually small and green.—Calyx-tube adnate to the ovary; limb 4- or 5-toothed. Petals 4 or 5, rarely 0, small, often triangular, valvate. Stamens inserted at the base of an epigynous disk; filaments subulate: anthers didymous or linear. Ovary inferior, 1–3-celled; style 0 or very short, stigma capitate, or 2 or 3 short recurved stigmas; ovules solitary, pendulous in each cell (if more than one) or 3 pendulous from the top of a column in 1-celled ovaries. Fruit usually a drupe, with a bony inner wall. Testa very thin, adherent; albumen copious, fleshy; embryo very small.

A small European Order, scattered over various parts of the world; to which the Cornel and Dog-wood belong.

Leaves glabrous, broad, and shining . . . . . 1. **GRISELINIA**.  
Leaves with silky pubescence beneath . . . . . 2. **COROKIA**.

#### 1. **GRISELINIA**, Forst.

Shrubs, with green branches, transversely scarred at the insertion of the leaf, said to be parasitical on roots of trees. Leaves very coriaceous, gla-



brous, broad, green, very oblique; veins irregularly netted, the main ones very oblique, the petiole expanded into a small sheath, jointed on the stem. Flowers in axillary panicles, diœcious.—*Male*: Calyx 5-toothed. Petals 5, valvate. Stamens 5; filament very short. *Female*: Calyx-tube adherent to the ovary; limb 5-toothed. Petals 5, obscurely imbricate. Stamens 0. Ovary ovoid, 1- or 2-celled; styles 3, very short, recurved, subulate. Fruit a fleshy 1- or 2-celled, 1-seeded berry; cotyledons divaricating.

To this should be referred *Decostea*, Ruiz and Pavon, of Peru and Chili, a genus of several species. It is also very nearly allied to the Japanese *Aucuba* of our gardens. Raoul figures petals in the female flower of *G. littoralis*, but I do not find them. I am doubtful whether the following species may not be varieties of one; both are in cultivation and look remarkably distinct. In the 'New Zealand Flora' they are regarded as varieties.

Leaves 2-7 in. Veins strong beneath . . . . . 1. *G. lucida*.  
Leaves 1-3 in. Veins very indistinct . . . . . 2. *G. littoralis*.

1. ***G. lucida***, *Forst.*;—*Fl. N. Z.* i. 98. An erect much-branched bush, 10-12 ft. high. Leaves 2-7 in. long, very obliquely ovate obovate or oblong, quite entire, obtuse or rounded at the tip, very unequal towards the base, one side much narrower than the other, which is often gibbous, in the upper shoots narrowed at the base, bright green, polished; veins very distinct on the under surface; petioles  $\frac{1}{2}$ -1 in. long, rather slender. Panicles axillary, often as long as the leaves, much branched, minutely pubescent with spreading, golden (when dry) hairs. Flowers minute; pedicels jointed, very short. Drupe  $\frac{1}{3}$  in. long, the fleshy part full of oil canals.

Var. *β. macrophylla*, very robust. Leaves almost orbicular, almost cordate at the base (perhaps only young shoots of *G. lucida*).

**Northern Island**: not unfrequent, *Banks and Solander*, etc. Paliser Bay, Cape Tura-kirae, on maritime rocks, and head of Ruamahanga river, *Colenso*. **Middle Island**: Dusky Bay, *Menzies*; Chalky Bay, *Lyall*. Var. *β. Northern Island*: Bay of Islands, *A. Cunninghamham*. Auckland, growing on *Metrosideros tomentosa*, Sinclair.

2. ***G. littoralis***, *Raoul, Choix*, xxii. t. 19. A small bush (or tree, 60 ft. high, *Raoul*), with paler foliage, less glossy than the two preceding. Leaves 1-3 in., ovate or oblong, less oblique at the base, wedge-shaped or narrowed into the slender rather long petiole; veins very obscure below. Peduncles much shorter than the leaves, pubescence and flowers as in *G. lucida*.

**Northern and Middle Islands**: not uncommon. Hawkes Bay, *Colenso*; ascending to 2500 ft. in the Canterbury forests, *Haast*; Otago, *Hector and Buchanan*. In cultivation, this is a very small shrub, more yellow-green and less shining than *G. lucida*.

## 2. COROKIA, A. Cunn.

Shrubs or small trees; branchlets and leaves below silvery with appressed pubescence. Leaves alternate, exstipulate, evergreen, quite entire, coriaceous. Flowers axillary or terminal, solitary or in panicles.—Calyx-tube turbinate, silky; limb 5-toothed, valvate. Petals 5, small, valvate, with a small scale at their base, silky outside, yellow. Stamens 5, filaments short; anthers linear. Ovary 1- or 2-celled; style short, stigma 2-lobed. Drupe small, ovoid, 1- or 2-celled. Seeds elongated, with a small slender embryo.

A small genus, confined, in so far as is at present known, to New Zealand.

Leaves lauceolate . . . . . 1. *C. buddleoides*.  
Leaves spatulate . . . . . 2. *C. cotoneaster*.

1. **C. buddleoides**, *A. Cunn.*;—*Fl. N. Z.* i. 98. An erect shrub or small tree, 10–40 feet high. Leaves shortly petioled, 2–6 in. long, narrow-lanceolate or oblong-lanceolate, acuminate, shining above, densely silky-tomentose beneath. Panicles short, 6–20-flowered. Pedicels bracteolate at the base, short. Flowers  $\frac{1}{4}$  in. long; petals oblong-spathulate, obtuse. Drupe red,  $\frac{1}{3}$ – $\frac{1}{2}$  in.—*Hook. Ic. Pl.* t. 424.

Var.  $\beta$ , *Fl. N. Z.* l. c. Leaves oblong-lanceolate, broader, not shining above, more densely tomentose below.

**Northern** Islands: margins of woods, etc., from the Bay of Islands to the east coast, *Banks and Solander*, etc. Var.  $\beta$ . **Chatham** Islands, *Dieffenbach*.

2. **C. Cotoneaster**, *Raoul, Choix*, 22. t. 20;—*Fl. N. Z.* i. 98. A low, rigid, spreading, much-branched bush, with woody, black, tortuous branches. Leaves alternate or fascicled,  $\frac{1}{3}$ –1 in. long, orbicular-obcordate-oblong-ovate or obovate, suddenly contracted into a flat linear petiole; margins recurved; tip rounded or emarginate, shining above, white beneath. Flowers axillary or terminal, solitary or few together. Pedicels much shorter than the petioles, bracteolate at the middle. Flowers as in *C. buddleoides*, but petals narrower and drupe shorter.

**Northern** Island: east coast, at Matapouri and Manukau Bay, etc., *Colenso*. **Middle** Island: common from Nelson to Otago, on the east side.

## ORDER XXXVI. LORANTHACEÆ.

Parasitical shrubs, with opposite or alternate, quite entire, coriaceous, ex-stipulate leaves, or jointed leafless branches. Flowers hermaphrodite or unisexual; bracts and bracteoles 1 or 3, sometimes connate or 0.—Calyx-tube adherent to the ovary; limb 0 or truncate or 4–8-toothed. Petals as many, rarely 0, sometimes united into a tubular corolla with valvate lobes. Stamens as many as the petals, opposite to and usually inserted on them. Ovary inferior, 1-celled; style long or short; stigma simple; ovule solitary, erect, adnate to the walls of the cavity. Berry 1-seeded. Seed albuminous; embryo straight; radicle superior.

A large tropical and subtropical Order of parasites, often very handsome, to which the common Mistletoe belongs. It is not Tasmanian, though extending to the south island of New Zealand.

Leaves opposite. Flowers hermaphrodite . . . . .	1. LORANTHUS.
Leaves opposite and alternate. Flowers diœcious . . . . .	2. TUPEIA.
Leaves 0. Branches jointed, flattened . . . . .	3. VISEUM.

### 1. LORANTHUS, Linn.

Parasitic shrubs. Leaves opposite or subopposite in the New Zealand species, jointed to the stem. Flowers axillary, solitary racemed or panicle, jointed to the pedicels and these to the peduncles.—Calyx-tube ovoid; limb short, truncate, cup-shaped. Corolla tubular, the petals 4, usually narrow, free or united into a tube below, upper part spreading or recurved. Stamens 4, filaments filiform; anthers linear, 2-celled. Style slender, jointed to the top of the ovary, deciduous, stigma capitate or clavate.

A very large tropical genus, of which many species differ from the character given above, in their alternate leaves and other characters.

Flowers $1\frac{1}{2}$ –2 in., spicate, in opposite pairs. Petals free. . . . .	1. <i>L. Colensoi</i> .
Flowers 1 in., subsolitary, axillary. Petals free . . . . .	2. <i>L. tetrapetalus</i> .
Flowers 1 in., paniced. Petals united below . . . . .	3. <i>L. tenuiflorus</i> .
Flowers $\frac{1}{2}$ in., racemed. Petals united below . . . . .	4. <i>L. flavidus</i> .
Flowers $\frac{1}{8}$ in., paniced. Petals free . . . . .	5. <i>L. micranthus</i> .

1. **L. Colensoi**, *Hook. f. Fl. N. Z. i. 99*. A large glabrous shrub. Branches woody, terete. Leaves  $1\frac{1}{2}$ –2 in., broadly oblong orbicular or obovate-oblong, narrowed into a short stout petiole,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, rounded at the tip, very coriaceous, quite nerveless or nerves very obscure and oblique. Flowers  $1\frac{1}{2}$ –2 in. long, scarlet, sessile, in pairs on a short, stout, 3–9-flowered peduncle,  $\frac{1}{2}$  in. long, erect. Bracts 0. Corolla terete, swollen at the base, straight; petals free. Anthers long, linear.—*Hook. Ic. Pl. t. 633*.

**Northern Island**: parasitic on *Metrosideros tomentosa*, Lake Waikare, *Colenso*. **Middle Island**: Nelson, *Bidwill*, *Munro*: Otago, *Lindsay*.

2. **L. tetrapetalus**, *Forst.*;—*Fl. N. Z. i. 99*. A middling-sized glabrous shrub. Branches terete. Leaves  $\frac{3}{4}$ – $1\frac{1}{4}$  in. long, linear-oblong or oblong, rounded at the tip, narrowed into very short petioles, very coriaceous, almost veinless or with 3 or 4 veins diverging from the base of the leaf. Flowers about 1 in. long, shortly pedicelled, solitary, rarely 2 together, axillary, erect. Calyx obscurely 4-toothed. Corolla terete, straight, rather swollen at the base; petals very narrow, linear, free. Anthers linear. Stigma very small.

**Northern and Middle Islands**: common on *Metrosideros* and *Vitex*, from the Bay of Islands to Canterbury, *Banks* and *Solander*, etc.

3. **L. tenuiflorus**, *Hook. f. Fl. N. Z. i. 100*. Glabrous. Branches slender, terete. Leaves 1– $1\frac{1}{2}$  in. long, obovate-oblong, rounded at the tip, narrowed at the base into a short petiole; veins slender and few. Flowers 1 in. long, in axillary trichotomous puberulous panicles; peduncles and pedicels slender, divaricating, about  $\frac{1}{4}$  in. long. Corolla slender, terete, curved; petals very narrow, united about  $\frac{2}{3}$  way up, perhaps separating afterwards. Anthers oblong. Stigma simple, flexuose.

Locality unknown. I have but one bad specimen of this very distinct species.

4. **L. flavidus**, *Hook. f. Fl. N. Z. i. 100. t. 27*. A glabrous shrub, 1–2 ft. high. Branches terete, the ultimate compressed or angled. Leaves 1–2 in. long, linear-oblong, obtuse or apiculate, narrowed into a short petiole, coriaceous, veinless or with 3–5 slender veins diverging from their base. Racemes axillary, drooping, 10–12-flowered, 1–2 in. long; peduncle rather slender; pedicels opposite,  $\frac{1}{8}$  in. long. Flowers yellow,  $\frac{1}{2}$  in. long. Corolla slender, straight, slightly swollen above the base; petals combined to above the middle. Anthers oblong. Stigma capitate, oblique.

**Northern Island**: Totaranui, *Banks* and *Solander*. On *Fagus*, in the Ruahine Mountains, *Colenso*. **Middle Island**: Nelson, on *F. Solandri*, *Sinclair* and *Munro*; Otago, lake district, *Hector* and *Buchanan*.

5. **L. micranthus**, *Hook. f. Fl. N. Z. i. 100*. A large glabrous shrub. Branches terete or angled; twigs much compressed, 2-edged. Leaves  $1\frac{1}{2}$ –3 in. long, oblong-ovate or obovate-oblong, obtuse or rounded at the tip, narrowed into short petioles, with small tumid, brown, scaly buds in their axils, veinless or with few slender veins branching from the midrib. Panicles

small,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, glabrous, with divaricating peduncles and pedicels  $\frac{1}{8}$ – $\frac{1}{6}$  in. long. Flowers minute, green,  $\frac{1}{8}$  in. long. Petals free, spreading, linear. Anthers oblong. Style suddenly tortuous; stigma capitate.

Common throughout the islands, from the Bay of Islands to Otago, *Banks and Solander*, etc.

## 2. TUPEIA, Chamisso and Schlechtendal.

A parasitical diœcious shrub. Branches terete, jointed. Leaves opposite and alternate.—Flowers paniced, not jointed to the pedicels, which are jointed to the peduncles. *Male*: Calyx 0. Petals 4, free, linear, recurved. Stamens 4; anthers broadly oblong. Ovary, style, and stigma 0. *Female*: Ovary ovoid with no calyx-limb. Petals 4, reflexed, linear, free. Stamens 0. Style short, straight, constricted below the capitate stigma, deciduous.

A genus of but one species.

1. **T. antarctica**, *Cham. and Schl.*;—*Fl. N. Z.* i. 101. t. 26. Branches terete; bark pale. Leaves  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, oblong obovate lanceolate or oblong-lanceolate, subacute, narrowed into short petioles, pale green, veinless or with faint veins branching from the midrib. Panicles small, axillary and terminal, 6–10-flowered. Peduncles and pedicels  $\frac{1}{8}$ – $\frac{1}{6}$  in. long, divaricate, very slender. Flowers ebracteate,  $\frac{1}{6}$  in. diam., greenish-yellow. Filaments about as long as the oblong anthers. Berry white or spotted with pink.—*T. pubigera* and *T. Cunninghamii*, Miquel, in *Linnæa*, xviii. 85.

Abundant throughout the islands, *Banks and Solander*, etc.; parasitic on various bushes, sometimes on *Loranthus micranthus*. A very variable plant, in size, colour, and robustness.

## 3. VISCUM, Linn.

Parasitical shrubs, of which the New Zealand species are small, leafless, with flattened, jointed branches, much constricted at the joints.—Flowers very minute, spicate or solitary or whorled at the joints of the branches, diœcious or monœcious. *Male*: Perianth 3- or 4-leaved. Anthers sessile and adnate to the perianth lobes; pollen in many cavities which open by pores. *Female*: Perianth 3- or 4-lobed. Stamens 0. Style 0 or short, stigma obtuse. Berry ovoid, succulent.

A very large, chiefly tropical and subtropical genus, including the Mistletoe, of which many species have the habit of *Loranthus* and otherwise differ from the two New Zealand ones.

Joints  $\frac{1}{2}$  in. broad, very flat. Flowers spiked . . . . . 1. *V. Lindsayi*.  
Joints  $\frac{1}{2}$  in. broad, terete. Flowers on the joints . . . . . 2. *V. salicornioides*.

1. **V. Lindsayi**, *Oliver, n. sp.* A small, glabrous, branching, succulent shrub, 4–6 in. high. Joints of stem obovate, very flat, rather longer than broad. Spikes often 3, starting from the upper joint, divaricating,  $\frac{1}{4}$  in. long. Peduncle jointed. Flowers very minute, whorled on the joints of the peduncle. Perianth 3-lobed; lobes persistent.

**Middle Island**: Otago, *Lindsay, Hector*. Parasitic on *Coprosma*, *Metrosideros*, and *Melicope*.

2. **V. salicornioides**, *A. Cunn.*;—*Fl. N. Z.* i. 101. A very small, glabrous, succulent plant, much branched, 3–4 in. high. Joints of stems



$\frac{1}{2}$ – $\frac{1}{8}$  in. long, terete, with a rather expanded top, not  $\frac{1}{20}$  in. broad. Flowers very minute, solitary or few together in the tips of the upper joints. Perianth 3-lobed; lobes persistent.

**Northern and Middle Islands:** common on *Leptospermum*, *Dracophyllum*, and various other shrubs.

## ORDER XXXVII. CAPRIFOLIACEÆ.

Shrubs or trees, rarely herbs. Leaves usually simple and exstipulate. Flowers hermaphrodite.—Calyx-tube adnate with the ovary; limb 4–5-lobed or toothed. Corolla tubular campanulate or rotate, with 4 or 5 imbricate teeth or lobes. Stamens as many as the lobes of the corolla, inserted on its tube, equal or unequal. Ovary inferior, 2–5-celled, surmounted with an epigynous disk; style often filiform, stigma simple or divided; ovules 1 or more in each cell, pendulous. Fruit generally a 1–5-celled berry. Seeds with fleshy albumen; embryo axile.

A small Order, chiefly confined to the north temperate zone, where the Honeysuckles and Viburnums form its largest known genera. It is chiefly distinguished from *Rubiaceæ* by the absence of stipules and often serrate leaves.

### 1. ALSEUOSMIA, A. Cunn.

Shrubs. Leaves rather membranous, alternate, polymorphous, with minute tufts of red (when dry) hairs in their axils. Flowers axillary, solitary or fascicled, deliciously scented, greenish; pedicels bracteolate.—Calyx-tube small, ovoid; limb 4- or 5-lobed, deciduous. Corolla tubular or funnel-shaped, with 4 or 5 small spreading lobes; edges inflexed, toothed or lobulate. Stamens 4 or 5; filaments very short, inserted at the mouth of the corolla; anthers oblong. Ovary 2-celled; style filiform, stigma subclavate; ovules several, in 2 series, inserted in the axis of the cells. Berry ovoid, 2-celled, several-seeded, with a broad terminal areola. Seeds angular; testa bony.

A small genus, confined to New Zealand, of which the species are excessively variable, apparently passing into one another, so that their forms are very difficult to discriminate. The alternate leaves are unusual in the Order.

Leaves 3–7 in., broad. Flowers 1 in., usually 5-merous . . . . 1. *A. macrophylla*.  
 Leaves 1–3 in., oblong or obovate. Flowers  $\frac{1}{2}$  in., 4- or 5-merous . . . . 2. *A. quercifolia*.  
 Leaves  $\frac{1}{2}$ –2 in., obovate or rhomboid. Flowers  $\frac{3}{4}$ – $\frac{1}{2}$  in., 4- or 5-merous . . . . 3. *A. Banksii*.  
 Leaves 1– $1\frac{1}{2}$  in., linear. Flowers  $\frac{3}{4}$ – $\frac{1}{2}$  in., 4- or 5-merous . . . . 4. *A. linariifolia*.

1. ***A. macrophylla*, A. Cunn.**;—*Fl. N. Z.* i. 102. t. 23. A shrub, 6–8 ft. high, perfectly glabrous; branches stout. Leaves 3–7 in. long, linear- or oblong-obovate, obtuse, entire or sparingly toothed, narrowed into short petioles, rather coriaceous. Flowers 1 in. long, fascicled or subpanicled. Calyx-lobes lanceolate, tips recurved. Corolla-lobes 3–5, with incurved, fimbriate margins. Berry about  $\frac{1}{2}$  in. long.

**Northern Island:** from the Bay of Islands to the Thames, in woods.

2. ***A. quercifolia*, A. Cunn.**;—*Fl. N. Z.* i. 103. A slender twiggy shrub, 2–3 ft. high, glabrous or the branchlets minutely puberulous. Branches

slender. Leaves 1–3 in. long, most variable, lanceolate, or oblong- or obovate-lanceolate or oblong, obtuse, entire or more or less deeply sinuate-toothed or lobed, like the Oak; petioles  $\frac{1}{4}$ – $\frac{1}{2}$  in. long. Flowers about  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, 4- or 5-lobed; pedicels slender. Berry  $\frac{1}{3}$  in. long.—*A. Ilex*, A. Cunn. Prodr.

**Northern Island:** Bay of Islands, *A. Cunningham*, to Te Hawera, *Colenso*.

3. ***A. Banksii***, *A. Cunn.*;—*Fl. N. Z.* i. 102. t. 24. A small straggling bush, with spreading branches, which are slender and puberulous. Leaves about 1 in. long, very variable, usually broadly-oblong obovate or rhomboid, with waved toothed or lobed margins. Flowers  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, generally solitary. Berry  $\frac{1}{6}$  in. long.—*A. atriplicifolia* and *palæiformis*, A. Cunn.

**Northern Island,** *Banks and Solander*; Bay of Islands, in woods, common, *A. Cunningham*, etc.

4. ***A. linariifolia***, *A. Cunn.*;—*Fl. N. Z.* i. 102. t. 25. A small erect shrub, 1–3 ft. high. Branches slender, glabrous or with minute spreading pubescence. Leaves 1–1 $\frac{1}{2}$  in. long, linear or linear-lanceolate, entire or sinuate-toothed, generally on very short petioles. Flowers  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, on slender pedicels, solitary or 2 or 3 together. Lobes of corolla obscurely toothed. Berry small, less than  $\frac{1}{4}$  in. long.—*A. ligustrifolia*, A. Cunn.

**Northern Island:** Bay of Islands, in woods, *A. Cunningham*, etc.

## ORDER XXXVIII. RUBIACEÆ.

Trees shrubs or herbs. Leaves opposite with interpetiolar stipules, or whorled, simple, quite entire, usually turning black when dried. Flowers regular, hermaphrodite or unisexual.—Calyx-tube adherent to the ovary, limb 4- or 5-toothed or -lobed or 0. Corolla rotate tubular funnel-shaped or campanulate, 4–9-lobed-toothed or -parted, valvate or imbricate. Stamens inserted on the corolla, as many as its lobes. Ovary usually 2- or 3-celled; styles 1 or 2, long, stigma 2- or 3-lobed or capitate; ovule 1 in the New Zealand species. Fruit various, in the New Zealand species dry or fleshy, with 2–6 cells or nuts and 1 seed in each cell. Testa very thin, albumen horny; embryo rather small, with flat cotyledons.

One of the largest Orders of flowering plants, of which the shrubby and arboreous species are very rare in the northern temperate zone, but frequent in the southern.

Shrubs or trees or woody-stemmed herbs. Leaves opposite. Flowers

unisexual . . . . .	1. COPROSMA.
Herbs, creeping. Leaves opposite. Flowers hermaphrodite . . . . .	2. NERTEA.
Herbs. Leaves whorled. Corolla rotate . . . . .	3. GALIUM.
Herbs. Leaves whorled. Corolla funnel- or bell-shaped . . . . .	4. ASPERULA.

### 1. COPROSMA, Forst.

Trees or shrubs, sometimes small and creeping, often fetid when bruised and drying. Leaves evergreen, opposite, with interpetiolar stipules. Flowers unisexual, often dioecious, often minute green and inconspicuous, solitary and sessile, or 2 or more clustered on the branches of a peduncle.—Calyx: *male*, cupular, equally or unequally 2–5-lobed or toothed, or truncate and erose, *female*, tube ovoid; limb 4–5-toothed or -lobed. Corolla tubular or funnel-

or bell-shaped; tube straight or curved; lobes 4 or 5, rarely 6-9, valvate. Stamens 4 or 5, rarely 6-9, inserted on the base of the corolla; filaments filiform, exserted; anthers linear, apiculate, pendulous. Ovary 2- rarely 3- or 4-celled; styles 2 (3 or 4), filiform, exserted, pubescent; ovule 1, erect in each cell. Drupe ovoid or round, with 2 (rarely 4) plano-convex 1-seeded cocci.

A large and extremely variable New Zealand genus, of which a few species inhabit the Pacific islands, Tasmania, temperate Australia, and the lofty mountain of Kini Balou, in Borneo. The New Zealand species are most difficult of discrimination, owing to their extreme variability, their being diœcious, and their very small flowers. I distinguish two chief groups, one with solitary female flowers, the other with these fascicled; then again some of the former have the flower obviously terminal on the shoot, between the uppermost pair of leaves; others have it apparently lateral, springing from the side of the shoot or branch below the leaves,—in other words, the flower is still terminal, but in shoots that are habitually leafless. In all cases connate stipules are abundantly developed below the flowers, forming one or more series of cup-shaped involuclers to the calyx. In some cases the calyx of the male flower is reduced or absent, and the upper series of connate stipules may be taken for it. It is not always easy to say whether this is so or no; and the structure of the calyx wants working out from fresh specimens. The following analysis of the supposed species is very imperfect; it has cost me several weeks' assiduous study of many specimens; many more are, however, wanted to establish the constancy or even prevalence of the characters employed, especially of the Northern Island species. The descriptions of the ten species originally published by A. Cunningham (Ann. Nat. Hist. (1839), ii. 206) are very faulty and incomplete, and the specimens in his Herbarium were much intermixed. Those in my 'Flora of New Zealand,' also, are very defective in regard to the alpine and Middle Island species, of which I have now better materials. As with so many other genera, it is vain to expect to name single specimens of single species; the characters are in most cases comparative, and until some general notion of the prevalent forms of the genus is obtained, the distinctive characters of the species, such as they are, cannot be appreciated, nor in some cases understood.

1. Shrubs or trees, erect, rarely prostrate, never creeping and rooting.

A. Female flowers aggregated (rarely solitary). Leaves glabrous, rarely fascicled.

a. Leaves 3-8 in., membranous, greenish when dry. Peduncles 1-2 in.

- Leaves 3-6 in. Corolla  $\frac{1}{2}$  in., tubular . . . . . 1. *C. lucida*.  
 Leaves 4-8 in. Corolla  $\frac{1}{4}$ - $\frac{1}{2}$  in., bell- or funnel-shaped . . . . . 2. *C. grandifolia*.

β. Leaves 1-3 in., black or brown when dry. Peduncle 0 or  $\frac{1}{8}$ -1 in. long.

- Robust, maritime; twigs glabrous. Leaves obovate, margins recurved . . . . . 3. *C. Baueriana*.  
 Slender, maritime; twigs pubescent. Leaves 1-2 in., obovate . . . . . 4. *C. petiolata*.  
 Robust. Leaves 2-3 in., oblong, coriaceous, acute . . . . . 5. *C. robusta*.  
 Leaves 1-2 in., linear or linear-oblong, subacute . . . . . 6. *C. Cunninghamii*.  
 Leaves 1-2 in., membranous, ovate-oblong, acute . . . . . 7. *C. acutifolia*.  
 Slender. Leaves orbicular or spatulate, petioles broad, flat . . . . . 8. *C. spatulata*.

B. Female flowers solitary, males solitary or fascicled.

a. Twigs hirsute or densely pubescent. Leaves more or less pubescent, especially the young.

- Leaves  $\frac{1}{4}$ - $\frac{3}{4}$  in. orbicular, membranous, cuspidate. Drupes didymous . . . . . 9. *C. rotundifolia*.  
 Leaves  $\frac{1}{4}$ - $\frac{3}{4}$  in., oblong or obovate, blunt or subacute . . . . . 10. *C. ciliata*.

β. Twigs glabrous or pubescent. Leaves glabrous (or puberulous in *C. divaricata* and *tenuicaulis*).

Flowers lateral. Leaves broad, small,  $\frac{1}{4}$ - $\frac{3}{4}$  in., spatulate oblong or orbicular.

- Leaves puberulous below, veins reticulate . . . . . 11. *C. tenuicaulis*.  
 Twigs very pubescent. Female corolla long, tubular, 4- or 5-fid 12. *C. rhamnoides*.  
 Twigs almost glabrous. Female corolla 4- or 5-partite . . . . . 13. *C. divaricata*.

- Twigs pubescent. Leaves very coriaceous. Female corolla 4- or 5-partite . . . . . 14. *C. parviflora*.  
 Flowers lateral. Leaves linear . . . . . 15. *C. propinqua*.  
 Flowers terminal. Leaves oblong, or obovate- or cuneate-oblong.  
   Leaves  $\frac{1}{2}$ -2 in. Flowers  $\frac{1}{4}$ - $\frac{1}{2}$  in. long . . . . . 16. *C. foetidissima*.  
   Leaves  $\frac{1}{4}$ - $\frac{3}{4}$  in., straight, oblong or oblong-lanceolate, retuse . . . . . 17. *C. Colensoi*.  
   Leaves  $\frac{1}{4}$ - $\frac{3}{4}$  in. recurved, coriaceous, cuneate-oblong . . . . . 18. *C. cuneata*.  
 Flowers terminal. Leaves very narrow, linear or linear-oblong.  
   Leaves geminate, in opposite pairs, linear, acerose,  $\frac{1}{20}$  in. broad . . . . . 19. *C. acerosa*.  
   Leaves in opposite fascicles, linear-lanceolate, rigid, concave above,  $\frac{1}{10}$  in. broad . . . . . 20. *C. depressa*.  
   Leaves linear or lanceolate, flat,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long,  $\frac{1}{12}$ - $\frac{1}{15}$  broad . . . . . 21. *C. microcarpa*.  
   Leaves  $\frac{1}{2}$ -1 in. long,  $\frac{1}{10}$ - $\frac{1}{8}$  in. broad, linear or lanceolate, concave; upper stipules tubular . . . . . 22. *C. linariifolia*.

II. *Stems prostrate and rooting. Small-leaved alpine species.*

- Leaves ovate-oblong or obovate. Corolla tubular, curved . . . . . 23. *C. repens*.  
 Leaves oblong or linear-oblong. Male corolla  $\frac{3}{8}$ - $\frac{1}{2}$  in. long . . . . . 24. *C. pumila*.

1. ***C. lucida*, Forst. ;—*Fl. N. Z.* i. 104.** A small dioecious or monœcious, perfectly glabrous, leafy tree; bark pale. Leaves 3-6 in. long, oblong-obovate or -lanceolate, acute or acuminate, narrowed into a petiole  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, membranous, bright green when dry, shining above, paler with veins finely reticulated below. Peduncles 1-2 in. long, 3-chotomously branched, bracteate at the axils. Flowers often crowded in threes at the ends of the pedicels, 5-merous;—*male*: calyx hemispherical, limb toothed; corolla tubular, about  $\frac{1}{8}$  in. long, 5-cleft to the middle, lobes erect; anthers linear, as long as the corolla;—*fem.*: calyx-limb truncate; corolla-lobes linear, reflexed; stamens minute, included; styles filiform, 3 or 4 times longer than the corolla. Drupe  $\frac{1}{3}$  in. long, pink.

**Northern** Island, abundant. **Middle** Island, *Banks and Solander*, etc.; Otago, lake district, and south-east coast, *Hector and Buchanan*. Fruit edible.

2. ***C. grandifolia*, Hook. f. *Fl. N. Z.* i. 104.** A small, perfectly glabrous tree, very similar to *C. lucida*, but with larger, more membranous, less shining leaves, and longer corollas. Bark pale. Leaves 4-8 in. long, elliptic- or obovate- or lanceolate-oblong, acute or cuspidate, green when dry but hardly shining, pale below, veins obscurely reticulated; petioles  $\frac{1}{3}$ -1 in. long. Peduncles 1-3 in. 2-bracteate, 3-chotomous; male pedicels bearing a dense head, females 3-flowered;—*male*: calyx minute, urceolate, 4- or 5-lobed; corolla  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, funnel- or bell-shaped, shortly 4- or 5-lobed; anthers much shorter than the corolla;—*fem.*: calyx-limb 4-toothed; corolla very slender, styles  $\frac{1}{2}$  in. Berry as in *C. lucida*, but seed usually longer.—*Ronabea australis*, A. Rich.

**Northern** Island: Bay of Islands to Wellington, common, *Banks and Solander*, etc. The corolla varies a good deal in shape and breadth.

3. ***C. Baueriana*, Endl. ;—*Fl. N. Z.* i. 105.** A small, perfectly glabrous, robust, monœcious, branching tree or large shrub, with almost fleshy bright-green foliage, black when dry. Branches stout, terete or 4-angled, perfectly glabrous; bark pale, wrinkled. Leaves  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, broadly oblong-obovate, obtuse rounded or retuse at the tip, rarely smaller, oblong-lanceolate and subacute, narrowed into short petioles, margins recurved, pale below with few veins. Peduncles as long as the petioles or shorter, stout,



rarely-branched, 3-many-flowered. Flowers  $\frac{1}{8}$ – $\frac{1}{6}$  in. long, capitate;—*male*: calyx minute, shortly 4-lobed; corolla bell-shaped; anthers broad;—*fem.*: calyx-lobes short, truncate or 4-lobed; corolla-tube short, terete, lobes 4, short, obtuse, spreading; styles very stout, about twice as long as the corolla. Drupe broadly obovoid,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long.—Endl. Icon. Pl. iii.; *C. retusa*, Banks and Sol.; Hook. f. in Journ. Bot. iii. 415.

**Northern Island**: common on maritime rocks. **Middle Island**: Massacre Bay, *Lyall*. This precisely accords with Endlicher's figure, drawn from a Norfolk Island specimen, and differs from the following in the perfectly glabrous branchlets and young leaves.

4. ***C. petiolata*, Hook. f. in Journ. Linn. Soc. Bot. i. 128 (1857).** A maritime shrub, very similar indeed to *C. Baueriana*, but the leaves are less fleshy, and the young foliage and branches covered with a minute pubescence. Leaves 1–2½ in. long, oblong-obovate, obtuse rounded or retuse, narrowed into rather slender petioles. Peduncles and flowers as in *C. Baueriana*, but the latter rather smaller.

**Northern Island**: maritime rocks south of Castle Point, *Coleenso*. **Kermadec Islands**, *M'Gilivray*. A variable plant. Coleenso's specimens are very small, from a small dense rigid shrub; the Kermadec Island ones have small leaves with margins hardly recurved. The same plant in Norfolk Island and Lord Howe's Island has much larger, more obovate leaves, rather green when dry. It may prove to be a variety of *C. Baueriana*, but the pubescent branches at once distinguish it.

5. ***C. robusta*, Raoul;—Fl. N. Z. i. 105.** A large erect, stout, perfectly glabrous, leafy, glossy green shrub. Branches glabrous; bark pale-brown, wrinkled, shining. Leaves numerous and close-set, 2–3 in. long,  $\frac{1}{2}$ –1¾ broad, elliptic-oblong or lanceolate, acute or acuminate, narrowed into short stout petioles, when dry brown, paler below, margins slightly recurved. Flowers very densely capitate, sessile or on short stout peduncles, heads nearly ½ in. diam.;—*male*: calyx minute, cupular, 4- or 5-toothed; corolla  $\frac{1}{6}$  in. long, bell-shaped, 4- or 5-lobed or parted; anthers linear-oblong;—*fem.*: calyx-tube tubular, truncate, entire or with 5–8 glandular points; corolla tubular, unequally 2–5-toothed; styles very stout. Drupe small, less than ¼ in. long.—Raoul, Choix, xxiii. t. 21.

Abundant in forests throughout the islands, *Banks and Solander*, etc. Raoul's figure is not characteristic of the excellent specimens he gave me. I suspect that this species may vary into the following.

6. ***C. Cunninghamii*, Hook. f., n. sp.** An erect twiggy bush, with slender or stout, erect, rarely divaricating, glabrous branches and twigs, and pale-brown bark. Leaves erect, often crowded, ½–2 in. long,  $\frac{1}{8}$ –¼ broad, linear or linear-lanceolate or -oblong, obtuse or acute, dark-brown when dry, paler below, coriaceous, flat; veins few, dark; stipules short, rather membranous. Flowers sessile, glomerate on lateral branchlets,  $\frac{1}{3}$  in. long;—*male*: calyx-lobes cupular, short, 4- or 5-toothed; corolla bell-shaped, 4- or 5-partite;—*fem.*: calyx-lobes tubular, 5–8-toothed; corolla shortly bell-shaped, 4–5-lobed to the middle or lower. Drupe ovoid, ¼ in. long, crowned with the tubular calyx-lobes.—*C. foetidissima*, A. Cunn. in part, not Forst.

**Northern Island**: common towards the seacoast. **Chatham Island**, *Dieffenbach*. **Middle Island**: Akaroa, *Raoul*. An extremely variable plant, perhaps a form of *C. robusta*, but very different-looking, with much smaller narrower leaves, sessile flowers, and

smaller fruit. In the 'New Zealand Flora' I had confounded it with *C. propinqua*, to which it is very near, but differs in the fascicled female flowers, larger leaves, and branches rarely divaricating at right angles. In Cunningham's Herbarium it is mixed with *propinqua*, under the name of *fetidissima*, Forst. From *C. linariifolia* it differs in the fascicled flowers, calyx and stipules not long and sheathing. I have gathered at the Bay of Islands what appears to be an extremely slender and narrow-leaved form of this, with almost white bark, and female flowers sometimes solitary.

7. *C. acutifolia*, Hook. f. in Journ. Linn. Soc. Bot. i. 128 (1857). A small tree, quite glabrous. Branches slender; bark pale. Leaves 1-2½ in. long, ⅓-1 broad, ovate or oblong-ovate, acute, membranous, dark-brown when dry; veins spreading, veinlets finely reticulated below; petioles slender, ¼ in. long; stipules broad, very deciduous. Peduncles as long as the petioles, slender, simple or 3-chotomously branched; branches 3-flowered;—*male*: ½ in. long; calyx minute, cupular; corolla between bell- and funnel-shaped, 4- or 5-lobed;—*fem.*: unknown.

**Kermadec** group, from the coast to the mountain-tops, *M'Gillivray*. A most distinct species. I have small specimens of a very similar and perhaps identical plant, with more coriaceous leaves and sessile drupes, gathered by Coleuso in the Ruahine district, where it forms a tree 12-18 ft. high.

8. *C. spathulata*, A. Cunn.;—*Fl. N.Z.* i. 106. A slender, glabrous, shining shrub, 3-5 ft. high and more, sparingly leafy. Branches spreading, twigs obscurely puberulous; bark pale, ashy or grey. Leaves ½-2 in. long, orbicular or broadly ovate, rounded retuse or 2-lobed at the tip, suddenly contracted into a flat winged petiole longer or shorter than the blade, rather coriaceous, glossy above, paler below, margins recurved, veins few, diverging, faint, not reticulated, brown when dry; stipules cuspidate, deciduous. Flowers sessile, axillary, small, ⅓ in. long;—*male*: solitary geminate or fascicled; calyx cupular, 4- or 5-lobed to the base, lobes linear, obtuse; corolla bell-shaped, 4- or 5-partite;—*fem.*: fascicled; calyx-tube ovoid, glabrous, limb 4- or 5-partite, lobes linear, erect, ciliate; corolla 4- or 5-partite to the base; styles twice as long as the corolla. Drupe ovoid, ¼-⅓ in.

**Northern** Island: Bay of Islands to Auckland, not uncommon in forests, etc., *Banks and Solander*, etc. A well-marked species, from the linear broad petioles and orbicular blade of the leaf, the long lobes of the calyx of both sexes, and deeply divided corolla of the female.

9. *C. rotundifolia*, A. Cunn.;—*Fl. N.Z.* i. 109. A large shrub, much and diffusely branched, 3-6 ft. high. Branches lax, long, very slender, divaricating at right angles; twigs pubescent, ultimate villous with spreading or appressed hairs; bark grey or pale-brown. Leaves in rather remote pairs, ¼-¾ in. long, orbicular or broadly oblong, cuspidate or abruptly acute, suddenly narrowed into slender ciliate petioles ⅓-⅔ in. long, very membranous, more or less ciliate and hairy, especially on the under surface; veins finely reticulate beneath; stipules small, membranous. Flowers very minute, ⅓-⅓ in. long;—*male*: solitary or 2 or 3, sessile; calyx cup-shaped, membranous, 4-toothed, teeth equal or 2 longer; corolla short, deeply 4-cleft;—*fem.*: calyx-tube hairy, limb shortly tubular, 4- or 5-toothed; corolla shortly funnel-shaped, unequally 4- or 5-cleft to the middle. Drupe very small, didymous, much broader than long, ⅓ in. broad.

**Northern** Island: marshy ground, river banks, etc., Bay of Islands, *A. Cunningham*, to Wellington; *Ralphs*. **Middle** Island: Otago, *Hector and Buchanan* (a scrap only). I have

only male flowers of Ralphs' specimen, which has smaller, oblong acuminate leaves. A most distinct form of species, from the slender habit, very membranous, ciliate (at length glabrous) cuspidate leaves, minute flowers, and didymous drupe.

10. **C. ciliata**, Hook. f. *Fl. Antarct.* i. 22. A lax or densely-branched shrub, 4–10 ft. high. Branches stout or slender, ultimate villous with rather rigid hairs; bark very pale, nearly white. Leaves tufted on short lateral branchlets,  $\frac{1}{4}$ – $\frac{2}{3}$  in. long, oblong, rounded or subacute at the tip, flat, rather membranous, very shortly petioled, petiole margin and under surface more or less ciliated, dusky brown when dry; veins few, nearly parallel to margin, not reticulated; stipules broad, villous, cuspidate. Flower and fruit unknown.

**Lord Auckland's** group and **Campbell's** Island, abundant, *J. D. H.* I have seen no New Zealand specimens of this most distinct species, which a good deal resembles *C. pilosa*, Endl., of Norfolk Island.

11. **C. tenuicaulis**, Hook. f. *Fl. N. Z.* i. 106. An erect shrub, 4–6 ft. high. Branches slender, divaricating, but not at right angles, puberulous, bark pale-grey or brown. Leaves generally in distant pairs,  $\frac{1}{4}$ – $\frac{1}{3}$  in., orbicular-spathulate, or broadly ovate-spathulate, obtuse or subacute, flat, puberulous on the under surface, veins few, reticulated in large arcoles, suddenly narrowed into short petioles, not coriaceous; stipules pubescent, not ciliated. Flowers axillary;—*male* solitary or fascicled; calyx cupular, minute, 4-toothed; corolla  $\frac{1}{8}$ – $\frac{1}{5}$  in. diam., between funnel- and bell-shaped, 4-lobed nearly to the base; anthers nearly as large as the lobes; *fem.*: unknown. Drupes very small, globose,  $\frac{1}{12}$ – $\frac{1}{8}$  in. diam.

**Northern** Island: Bay of Islands, *Colenso*, etc. What I have described in *Fl. N. Z.* as the female flower of this, I now refer without hesitation to *C. divaricata*, which this species closely approaches, but differs in the bark, in the less divaricating branches, leaves in series of pairs on the twigs (not in terminal pairs on lateral branchlets), pubescent, reticulated veined below, and in the globose drupe.

12. **C. rhamnoides**, *A. Cunn.*;—*Fl. N. Z.* i. 107. A densely branched bush, 2–4 ft. high or more. Branches slender, much divaricating, divided often flexuous and interlaced, pubescent; bark pale, not smooth and even. Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. long,  $\frac{1}{6}$ – $\frac{1}{2}$  broad, orbicular or oblong, rounded retuse or acute, narrowed suddenly into a short petiole, flat, greenish-brown, quite glabrous; veins very indistinct, not reticulated. Flowers minute, solitary, axillary,  $\frac{1}{10}$  in. long, on short curved bracteolate peduncles;—*male*: calyx cupular, 4-lobed, membranous; corolla bell-shaped, 4-lobed;—*fem.*: calyx-tube ovoid, glabrous, limb shortly tubular, 4- or 5-lobed; corolla tubular, rather slender, curved, mouth shortly 4- or 5-cleft; styles filiform. Drupe very small,  $\frac{1}{10}$ – $\frac{1}{6}$  in. diam., globose or oblong.—? *C. gracilis*, *A. Cunn.*

**Northern** and **Middle** Islands: not uncommon from the Bay of Islands to Otago. The divaricating slender pubescent branches, small broad glabrous leaves, minute axillary flowers, and tubular female corolla, are the best marks of this species, which in Cunningham's Herbarium is mixed with the following.

13. **C. divaricata**, *A. Cunn.* A laxly branched shrub, 8–10 ft. high; branches very slender, widely divaricating, glabrous or minutely pubescent; bark dark red-brown, quite even. Leaves in pairs on very short lateral shoots,  $\frac{1}{3}$ – $\frac{3}{4}$  in. long, orbicular or obovate-spathulate, shortly petioled, in small varieties



coriaceous, in larger membranous and puberulous when young, contracted into petioles of variable length; veins not reticulated. Flowers;—*male*: not seen; *fem.*: axillary, solitary, minute,  $\frac{1}{12}$  in. long; calyx-tube glabrous, limb short, tubular, unequally and often irregularly 4- or 5-lobed; corolla 4- or 5-partite, almost to the base; styles slender. Drupe small, obovoid,  $\frac{1}{6}$ – $\frac{1}{5}$  in. long, variable in size and colour.

Common in the **Northern** and probably throughout the islands, Otago, *Lyall*. I am greatly puzzled with this plant, which is the *C. divaricata*,  $\delta$ . *latifolia*, and  $\epsilon$ . *coriacea*, of my N. Z. Flora, and in Cunningham's Herbarium is mixed with *C. rhamnoides*, and is with difficulty distinguished from it; its prominent characters are, the very slender branches divaricating at right angles, the smooth brown bark, almost glabrous twigs, and female corolla not tubular and cleft at the mouth, but spreading and divided to the base. The large-leaved form (*latifolia*) has larger membranous rounded leaves, somewhat pubescent below, the smaller (*coriacea*) has more coriaceous spatulate leaves. Of the variety  $\gamma$ . *pallida* of Fl. N. Z., which has young male flowers only, I can make out nothing more; it has pale bark, and spatulate leaves, opposite throughout the twigs, it was collected by Colenso in the Wairarapa valley, where it forms a small tree 5–7 ft. high, and where also the tree *divaricata* grows. Cunningham's *C. gracilis* (*divaricata*,  $\beta$ . *gracilis*, Fl. N. Z.) has neither flower nor fruit, and is, I now think, referable to *C. rhamnoides*, having more pubescent twigs than *C. divaricata*.

14. **C. parviflora**, *Hook. f. Fl. N. Z.* i. 107. A large dense rigid branching leafy bush. Branches slender, pubescent, divaricating more or less; bark pale-grey. Leaves small, rather close-set, fascicled on lateral branchlets, very uniform,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, obovate or linear-oblong, rounded at tip, rarely subacute, very shortly petioled, rigid, flat, not shining, dark-brown when dry, very obscurely veined; stipules pubescent, ciliate. Flowers minute, lateral, solitary, subsessile;—*male*: calyx cupular, 4-toothed; corolla  $\frac{1}{10}$  in. long, broadly bell-shaped, 4-partite;—*fem.*: calyx-limb glabrous, tube very short, jagged, and ciliolate; corolla  $\frac{1}{12}$  in., 4- or 5-cleft  $\frac{3}{4}$  way down; style  $\frac{1}{6}$  in. Drupe ovoid,  $\frac{1}{6}$ – $\frac{1}{4}$  in.—*C. myrtillofolia*,  $\alpha$ , Fl. Antart. i. 21; Fl. N. Z. i. 108.

**Northern and Middle Islands**: low grounds; common in woods as far south as Otago, also on the mountains, Tongariro and Ruahine range, *Colenso* and *Bidwill*. **Auckland's Island**, *J.D.H.* I think that my *C. myrtillofolia* of Lord Auckland's Island is referable to this very common species, and as it was described without flower or fruit, that name had better be abandoned. Its axillary minute flowers distinguish it well from *C. Colensoi*, and its very coriaceous uniform leaves from *C. divaricata*, *rhamnoides*, and *tenuicaulis*.

15. **C. propinqua**, *A. Cunn.*;—*Fl. N. Z.* i. 109. Tall, erect, glabrous, woody, sparingly leafy, 4–8 ft. high. Branches divaricating, glabrous, scarcely puberulous at the tips; bark brown. Leaves usually in pairs on short axillary branchlets,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long,  $\frac{1}{12}$ – $\frac{1}{10}$  broad, narrow linear-oblong, obtuse, narrowed at the base, nearly flat, coriaceous, veins indistinct; stipules obtuse, glabrous. Flowers lateral;—*male*: fascicled,  $\frac{1}{10}$  in. long; calyx cupular, 4- or 5-toothed; corolla bell-shaped, 4- or 5-cleft nearly to the base;—*fem.*: calyx glabrous, limb tubular, 4- or 5-toothed; corolla not seen. Drupe ovoid,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long.

**Northern Island**: common from the Bay of Islands, *A. Cunningham*, to Hawke's Bay, *Colenso*, in wet places. This is the *C. propinqua*,  $\alpha$  and  $\beta$ , Fl. N. Z.;—the  $\gamma$ . *linariifolia* is certainly a different species, of which I have since procured fine specimens.

16. **C. foetidissima**, *Forst.*;—*Fl. N. Z.* i. 105, and ii. 331. A large glabrous shrub or small tree 8–20 ft. high, intensely fetid after being bruised,



sometimes smaller and procumbent. Branches slender, not divaricate, the ultimate minutely puberulous, bark very pale, white or grey. Leaves 1–2½ in. long,  $\frac{1}{3}$ – $\frac{3}{4}$  broad, oblong or linear- or obovate-oblong, narrowed into a rather slender petiole  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, obtuse or subacute, flat, rather membranous, pale or dark-brown when dry, not shining; veins 0, or diverging and indistinct, not reticulated; stipules glabrous or puberulous and minutely ciliate, cuspidate, the uppermost sheathing. Flowers terminal on the branchlets, solitary, sessile, pendulous, rather large,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long;—*male*: calyx cupular, 4- or 5-toothed; corolla broadly campanulate, 4- or 8-lobed to the middle; anthers large, linear-oblong, as long as the corolla;—*fem.*: calyx-tube narrow-ovoid, limb short, tubular, toothed; corolla tubular, curved, 4- or 5-cleft  $\frac{1}{3}$ – $\frac{1}{2}$  way down; styles very stout and long,  $\frac{1}{3}$ – $\frac{3}{4}$  in. Drupe generally large, ovoid, very fleshy,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long.—*Fl. Antarct. i. 20. t. 13; C. affinis*, *Fl. Antarct. l. c.*; *C. repens*, A. Rich.; *C. pusilla*, Forst.?

Mountainous districts of the **Northern** and **Middle** Islands: abundant. **Lord Auckland's** group and **Campbell's** Island: abundant. The fetid odour, oblong leaves, and large solitary terminal flowers, well characterize this most distinct species; the leaves are very variable.

17. **C. Colensoi**, *Hook. f., n. sp.*—*C. myrtillifolia*,  $\gamma$ . *linearis*, *Fl. N. Z. i. 108.* A small, subalpine, slender, perfectly glabrous shrub, 3–4 ft. high. Branches slender, spreading, puberulous; bark white or grey. Leaves usually fascicled on short lateral twigs,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long,  $\frac{1}{6}$ – $\frac{1}{3}$  broad, very variable in shape, narrow-oblong lanceolate- or obovate-oblong, more or less obtusely truncate and emarginate, narrowed into short slender petioles, margins subrecurved, pale yellow-brown when dry, coriaceous, almost veinless; stipules glabrous, not ciliated. Flowers solitary, terminal, on very short curved pedicels;—*male*:  $\frac{1}{3}$  in. long; calyx cupular, 4-lobed, 2 lateral lobes much longer, patent; corolla bell-shaped, 4-lobed, but not to the middle;—*fem.*: calyx-tube cupular, unequally jagged and ciliate; corolla  $\frac{1}{2}$  in. long, 5-partite, lobes spreading. Drupe small,  $\frac{1}{8}$  in. long, ovoid.

Mountainous regions in the **Northern** Island, near Cook's Straits, *Colenso*. A very distinct species, allied to *C. parviflora*, in the retuse apices of the coriaceous leaves, the white bark, and olive-brown hue when dry; but differing in the slender habit, lax foliage, leaves not recurved, and stipules not ciliated. When out of flower with difficulty to be distinguished by descriptions from *divaricata*, *tenuicaulis*, and other lowland species, with which it has no real affinity however.

18. **C. cuneata**, *Hook. f. Fl. Antarct. i. 21. t. 15; Fl. N. Z. i. 110.* A rigid, woody, much branched, erect or prostrate, very leafy shrub, 1–7 ft. high. Branches stout, glabrous or puberulous; bark white brown or black. Leaves fascicled, close-set,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad, cuneate-oblong or obovate-lanceolate or linear-obovate, retuse obtuse or subacute, often recurved, very rigid coriaceous and shining, a deeply sunk midrib above, almost veinless below; stipules (young) with fimbriate or densely ciliate margins. Flowers terminal;—*male*: calyx cupular, jagged and fimbriate at the mouth; corolla  $\frac{1}{4}$  in. long, nearly  $\frac{1}{3}$  diam., with short funnel-shaped limb, and 4 or 5 long spreading lobes; anthers  $\frac{1}{5}$  in. long;—*fem.*: calyx glabrous, with a 4- or 5-lobed limb; corolla not seen. Drupe globose or oblong, rather small,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long.

Mountains of the **Northern** and **Middle** Islands: Ruahine and Lake Taupo ranges,

and Mount Hikurangi, *Colenso*; Mount Egmont, *Dieffenbach*; Otago, lake district, *Hector and Buchanan*. Common in **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* I believe this to be one of the most distinct forms of the genus, but almost impossible to distinguish by foliage from some states of *C. parviflora* and others: its prevalent characters are the very stout leafy habit, small recurved, very rigid and coriaceous, more or less cuneate leaves, finbriate or densely ciliate young stipules, and terminal, solitary, rather large flowers; but flat-leaved forms approach *C. parviflora*, narrow-leaved ones *C. propinqua*, lax-leaved ones *C. Colensoi*, and the stipules are sometimes glabrous.

19. ***C. acerosa***, *A. Cunn.*;—*Fl. N. Z.* i. 109. A low, excessively branched, spreading shrub, 2–5 ft. high. Branches divaricating, flexuous and tortuous, puberulous; bark yellow-brown. Leaves uniform, in opposite pairs or opposite fascicles on the twigs,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long,  $\frac{1}{20}$  broad, linear, subacute, erecto-patent, veinless; stipules short, puberulous, not ciliate. Flowers;—*male*: calyx cup-shaped, 4-lobed, 2 lobes short acute, 2 much longer oblong obtuse; corolla  $\frac{1}{6}$ – $\frac{1}{4}$  in. diam., broadly bell-shaped, 4-cleft to or below the middle;—*fem.*: minute, calyx-limb very short, 4-toothed; corolla  $\frac{1}{12}$  in., 4-cleft to the middle; styles as long as the leaves. Drupe ovoid, nearly  $\frac{1}{4}$ – $\frac{1}{2}$  in. long.

**Northern, Middle, and Southern Islands**: not uncommon in rocky places, sand-banks, forests, etc.; Hokianga, etc., in salt marshes, *A. Cunningham*. *Colenso* remarks that at Ahuriri the berries are sky-blue, transparent, as large as sloes, and eaten by the natives. A most distinct plant. I have a prostrate form from the mountains of Canterbury, alt. 4000 ft., and the lake district, Otago.

20. ***C. depressa***, *Col.*;—*Fl. N. Z.* i. 110. A small, dense, prostrate, much branched bush, 1–4 ft. high. Branches pubescent; bark grey. Leaves in opposite fascicles,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long,  $\frac{1}{16}$  wide, spreading, rather recurved, linear-lanceolate, acute or obtuse, rigid, coriaceous, nerveless, rather concave, yellow-green when dry; stipules pubescent and ciliate. Flowers;—*male*: calyx minute, cup-shaped, equally 4-toothed; corolla  $\frac{1}{10}$  in. long, bell-shaped, 4- or 5-cleft;—*fem.*: calyx-limb short, 4-toothed; corolla not seen. Drupe orange-yellow, sweet, about  $\frac{1}{6}$  in. long.

**Northern Island**: in mountainous localities, Lake Taupo, top of Ruahine and Hawke's Bay ranges, *Colenso*. Perhaps a form of *C. cuneata*, but with much smaller narrower leaves. Some forms approach *C. acerosa*, but the leaves are always broader and rather concave when dry.

21. ***C. microcarpa***, *Hook. f. Fl. N. Z.* i. 110, and ii. 331. A leafy shrub, 1–10 ft. high. Branches slender, close-set, divaricating, pubescent, leafy; bark grey. Leaves in pairs on short slender lateral branchlets,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long,  $\frac{1}{15}$ – $\frac{1}{12}$  in. broad, spreading, linear or linear-lanceolate, acute, flat, veinless, dark-brown when dry, not coriaceous; stipules short, ciliate. Flowers minute;—*male*: calyx cup-shaped, 4-toothed; corolla broadly bell-shaped,  $\frac{1}{5}$  in. diam., 4-partite, lobes narrow acuminate, long;—*fem.*: calyx-limb short, tubular, 4-toothed; corolla  $\frac{1}{12}$  in., tubular or funnel-shaped, 4-cleft  $\frac{1}{4}$  way down. Drupe very small, globose,  $\frac{1}{10}$  in. diam.

**Northern Island**: tops of the Ruahine mountains, *Colenso*. Perhaps a variety of *C. cuneata*.

22. ***C. linariifolia***, *Hook. f.*;—*C. propinqua*,  $\gamma$ , *Fl. N. Z.* i. 109. A tall, erect, branching shrub. Branches spreading, slender or rather stout, twigs puberulous; bark grey or black. Leaves all opposite (rarely fascicled),  $\frac{1}{2}$ –1 in. long,  $\frac{1}{10}$ – $\frac{1}{6}$  in. broad, linear linear-lanceolate or oblong-lanceolate,

acute or acuminate, flat, rather coriaceous, black when dry; stipules puberulous, the upper produced into long sheaths, acute, ciliate. Flowers;—*male*: not seen;—*fem.*: calyx-limb of 4 long, linear, erect, obtuse teeth; corolla 4-partite,  $\frac{1}{10}$  in. long, lobes narrow acuminate; styles as long as the leaves. Drupe ovoid,  $\frac{1}{4}$  in. long, generally crowned with the calyx-limb.

**Northern** and **Middle** Island: in mountain localities; Ruahine mountains and woods at Manawarakua, etc., *Colenso*; banks of the Waihopai, *Munro*; Lake Tekapo, *Haast*; Otago, *Lindsay*. A very well marked species by the foliage, long calyx-lobes and styles of the female flower, and long sheathing stipules; in many respects it closely resembles states of the *C. Cunninghamii* and *C. propinqua*.

23. **C. repens**, *Hook. f.*;—*Fl. Antarct. i. 23. t. 16 A (not A. Rich.)*; *Fl. N. Z. i. 110*. A small alpine matted species, with long prostrate, creeping, rather stout flaccid stems and branches, densely leafy. Branches glabrous, bark pale. Leaves close-set and fascicled,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, spreading or recurved, ovate-oblong or obovate, rounded at the tip, concave, very coriaceous, rather shining, black when dry, with thickened margins; veins 0; stipules short, obtuse, glabrous. Flowers:—*male*: not seen;—*fem.*: minute, sessile; calyx shortly 4-toothed; corolla  $\frac{1}{11}$  in. long, tubular, curved, 4-cleft at the mouth; styles sometimes 3 or 4. Drupe large, very succulent, sometimes nearly  $\frac{1}{2}$  in. long, orange-yellow, with 2–4 nuts.

**Northern** Island: open grounds near Lake Taupo, *Colenso*. **Lord Auckland's** group and **Campbell's** Island: common on the hills, *J. D. H.* Probably common in the Southern Alps, but I have seen no specimens.

24. **C. pumila**, *Hook. f. Fl. Antarct. i. 22. t. 16 B*; *Fl. N. Z. i. 3*. A small, alpine, creeping, tufted species. Branches densely leafy, glabrous; bark pale. Leaves imbricate, patent or suberect,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, oblong linear-oblong or -obovate, obtuse or acute, rigid, very coriaceous, shining and rather concave when dry, veinless; stipules glabrous, obtuse. Flowers sessile, erect;—*male*: very large,  $\frac{1}{3}$ – $1\frac{1}{2}$  in. long; calyx cupular, 4-lobed; corolla tubular, curved, shortly 4- or 5-lobed; anthers very large;—*fem.*: calyx 5-toothed; corolla like the male, but half the size; styles 2. Drupe  $\frac{1}{4}$  in. long, orange-yellow.

Mountains of the **Northern** Island: summit of Ruahine mountains, *Colenso*. **Middle** Island: subalpine regions near the Great Godley glacier, *Haast*; Otago, lake district, *Hector* and *Buchanan*.

## 2. NERTERA, Banks and Solander.

Small creeping herbs. Leaves petioled, ovate, stipulate. Flowers axillary, solitary, sessile, hermaphrodite.—Calyx-tube ovoid; limb truncate or obscurely 4-toothed. Corolla tubular or funnel-shaped, 4- or 5-lobed. Stamens 4 or 5, inserted at the base of the corolla; filaments exserted; anthers large, pendulous. Ovary 2-celled; styles 2, filiform, very long, hirsute; cells 1-ovuled. Drupe red, fleshy, containing 2 plano-convex, coriaceous, 1-seeded nuts.

A small genus, of which one species is widely diffused in the southern hemisphere, the others are natives of New Zealand. It scarcely differs from *Coprosma*, except in the herbaceous habit.

Perfectly glabrous.	Leaves broadly-ovate . . . . .	1. <i>N. depressa</i> .
Perfectly glabrous.	Leaves narrow-ovate . . . . .	2. <i>N. Cunninghamii</i> .

Hairy or villous. Leaves cordate-ovate, long petioled . . . . 3. *N. dichondraefolia*.  
 Hispid or glabrate. Leaves ovate or oblong, short petioled . . . 4. *N. setulosa*.

1. ***N. depressa***, *Banks and Sol.*;—*Fl. N. Z.* i. 112. Perfectly glabrous. Stems creeping and rooting, tufted, 6–10 in. long, 4-gonous. Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, broadly ovate, acute or obtuse, coriaceous or almost fleshy; petioles as long as the blade or shorter. Stipules very small. Flowers minute, sessile,  $\frac{1}{10}$  in. long. Calyx-limb 4-toothed. Corolla funnel-shaped.

**Middle Island**: Wai-au-au mountains, alt. 3000 ft., *Travers*. **Southern Island**, *Lyall*. **Lord Auckland's group**, *J. D. H.* Also found in Tasmania, Tristan d'Acunha, and the Andes of South America, from Mexico to Puegia.

2. ***N. Cunninghamii***, *Hook. f. Fl. N. Z.* i. 112. Altogether very similar to *N. depressa*, but smaller, more slender, with more acute leaves. Calyx-limb obscurely 4-lobed. Corolla shortly funnel-shaped. Stamens erect.

**Northern Island**: Bay of Islands, common in moist places; Taupo plains, *Colenso*. This appears also to be a Philippine Island plant.

3. ***N. dichondraefolia***, *Hook. f. Fl. N. Z.* i. 112. *t.* 28 A. Stems slender, creeping, hairy or villous, a span to 2 feet long. Leaves  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, broadly ovate-cordate, acute or apiculate, membranous, more or less hairy above, glabrous below; petiole slender, as long as the blade. Flowers very small and fruit as in *N. depressa*.—*N. gracilis*, Raoul, in *Ann. Sc. Nat.*; *Geophila (?) dichondraefolia*, A. Cunn.

**Northern and Middle Islands**: common in damp places. Very variable in size and hairiness.

4. ***N. setulosa***, *Hook. f. Fl. N. Z.* i. 112. *t.* 28 B. Small, hispid or glabrate; stem rigid, wiry, slender, 2–3 in. long; branches erect or ascending. Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, broadly ovate or oblong, obtuse, with stiff white hairs on the upper surface, glabrous below; petiole short; stipules small, notched. Flowers white, inconspicuous, as long as the leaves. Calyx-tube hispid. Corolla very slender, 4- or 5-toothed. Filaments long, exserted; anthers pendulous, linear-oblong, 2-lobed at the base. Styles very long. Drupe small, hispid. Embryo very minute.

**Northern Island**: Ahuriri and head of Wairarapa valley, *Colenso*.

### 3. GALIUM, Linn.

Slender, weak, prostrate, erect or climbing, often hispid herbs; stems 4-angled. Leaves whorled, entire or ciliated. Flowers minute, white or yellow, on axillary, simple or branched peduncles.—Calyx-tube globose; limb 0. Corolla rotate, 3- or 4-partite; lobes valvate. Stamens 3 or 4; filaments short; anthers didymous. Ovary 2-celled; styles 2, short, with simple or capitate stigmas; ovules 1 in each cell. Fruit minute, of 2 dry, 1-seeded carpels.

A very large European and Oriental genus, found also in most other parts of the world.

Leaves 4-nate, linear-lanceolate . . . . . 1. *G. tenuicaule*.  
 Leaves 4-nate, oblong, mucronate . . . . . 2. *G. umbrosum*.

1. ***G. tenuicaule***, *A. Cunn.*;—*Fl. N. Z.* i. 113. Stem straggling; branches 4 in.–3 ft. long, glabrous or scabrid. Leaves whorled in fours,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, oblong- or linear-lanceolate, awned or acuminate, scabrid on



the edges and midrib below. Peduncles 1-3-flowered, spreading, longer or shorter than the leaves, decurved in fruit. Flowers white,  $\frac{1}{12}$  in. diam. Fruit of 2 minute, globose, glabrous carpels.

**Northern and Middle Islands:** abundant in grassy situations, ascending to 4000 ft., *Banks and Solander*, etc.

2. **G. umbrosum**, *Forst.*—*G. propinquum*, A. Cunn.;—Fl. N. Z. i. 113. Very variable, annual, usually erect and rather stiff, but often weak and straggling, 1-10 in. long, glabrous or ciliated on the stem and leaves. Leaves in whorls of 4,  $\frac{1}{10}$ — $\frac{1}{3}$  in. long, broadly oblong, acuminate or awned, marked with pellucid dots when seen between the eye and light. Peduncles 1-3-flowered, longer or shorter than the leaves. Flowers very minute, white. Fruit of 2 globose, smooth, minute carpels.

Abundant throughout the islands, *Banks and Solander*, etc. I suspect that the Tasmanian *G. ciliare*, nob., does not differ from this.

#### 4. ASPERULA, Linn.

Characters of *Galium*, but corolla more or less bell- or funnel-shaped.

A less frequent genus than *Galium*, but very large and with about the same distribution.

1. **A. perpusilla**, *Hook. f.* Fl. N. Z. i. 114. A small, slender, decumbent, inconspicuous annual, everywhere perfectly glabrous. Stems very short, 1-2 in., filiform, branched. Leaves 4 in a whorl,  $\frac{1}{10}$ — $\frac{1}{2}$  in. long, lanceolate, acuminate, awned, often curving to one side. Flowers solitary, sessile, white. Calyx-tube glabrous. Corolla funnel-shaped,  $\frac{1}{12}$  in. diam., 4-partite; lobes linear. Styles united, their tips free, divergent.

**Northern and Middle Islands:** not uncommon in dry and sandy places; base of Tongariro and of the Tararua range, *Colenso*; upper Motucka alps, 2000 ft., *Haast, Munro*; Canterbury, *Travers*; Otago, *Hector and Buchanan*. The smallest known species of the genus, and the smallest flowering plant, except *Tillæa* and *Lemna* in the islands.

Two species of the Australian genus *Opercularia* are described (erroneously) by Gærtner as having been found in New Zealand by Banks and Solander; there are no specimens of them in Banks's Herbarium. The flowers are in involucrate heads, and the capsules open by transverse lids.

### ORDER XXXIX. COMPOSITÆ.

Herbs shrubs or trees. Leaves alternate, rarely opposite, simple in most of the New Zealand species, exstipulate. Flowers minute (florets), sessile, densely crowded on flat or conical receptacles, forming heads surrounded by an involucre consisting of 1 or more series of linear, erect bracts. Receptacle naked or bearing scales, smooth, pitted or papillose.—Calyx-tube adnate with the ovary; limb 0 or represented by bristles scales or hairs (pappus). Corolla of two forms, tubular and 4- or 5-cleft with valvate lobes, or tubular below with a long linear limb; usually both kinds occur in each head, the outer ligulate (ray-florets) forming a ray of 1 or 2 series round the inner which are tubular (disk flowers); the ray-flowers are female or hermaphrodite, the disk-flowers male or hermaphrodite. Stamens 5, inserted on the tube of

the corolla; anthers usually united in a tube which sheaths the style; cells often produced downward (tailed). Ovary inferior, 1-celled; style filiform, with 2 stigmatic branches; ovule 1, erect. Fruit a dry nut or achene. Seed erect; testa membranous; albumen 0; cotyledons oblong, plano-convex, radicle short, inferior.

One of the largest Orders of flowering-plants, found in almost every part of the globe to which flowering plants extend. The New Zealand genera are with few exceptions Australian also.

Subord. 1. **Corymbiferae**.—*Florets all tubular, or of the ray ligulate. Herbs shrubs or trees, without milky juice.*

(1. ASTEROIDEÆ.)

a. *Ligulate florets, when present, never yellow. Pappus rigid, of long unequal scabrid hairs.*

- |   |                   |
|---|-------------------|
| Shrubs or trees. Peduncles 1- or many-flowered. Leaves whitish below. Veins branching . . . . . | 1. OLEARIA.       |
| Herbs. Peduncles many-flowered. Leaves large, with many parallel ribs . . . . .                 | 2. PLEUROPHYLLUM. |
| Herbs. Leaves all radical. Scape 1-flowered . . . . .   | 3. CELMISIA.      |
| Branched herb, leafy, branches 1-flowered . . . . .   | 4. VITTADINIA.    |

β. *Ligulate florets white or purplish, revolute. Pappus 0, or of small scales or short hairs.*

- |  |                 |
|--|-----------------|
| Scapigerous herbs. Achene beaked. Pappus 0 . . . . .                   | 5. LAGENOPHORA. |
| Scapigerous herbs. Achene not beaked. Pappus very short or 0 . . . . . | 6. BRACHYCOME.  |

(2. SENECTIONIDEÆ.)

γ. *Ligulate florets white or yellow. Pappus of 2 bristles . . . . .* 7. BIDENS.

δ. *Florets all tubular. Pappus 0.*

- |  |                 |
|--|-----------------|
| Tufted moss-like herbs. Florets purplish . . . . .   | 8. ABROTANELLA. |
| Heads yellow, unisexual or with ♀ and ♂ florets; outer fl. ♀ in 1 or many series . . . . . | 9. COTULA.      |

ε. *Florets all tubular, yellow. Heads all collected into one dense globose ball. Pappus soft and plumose.*

- |   |                |
|---|----------------|
| Scapigerous herbs, with globose inflorescence . . . . . | 10. CRASPEDIA. |
|---|----------------|

ζ. *Ligulate florets, if present, yellow (inner scales of involucre sometimes white, spreading, and resembling a ray). Pappus of soft, white hairs.*

† Shrubs. Leaves all small. Involucral scales in many series. Ligulate fl. 0.

- |   |                 |
|---|-----------------|
| Receptacle narrow, with scales amongst the flowers . . . . .        | 11. CASSINIA.   |
| Receptacle narrow, not without scales amongst the flowers . . . . . | 12. OZOTHAMNUS. |

†† Herbs. Involucral scales in 2 or several series. Ligulate fl. 0.

- |  |                 |
|--|-----------------|
| Small, creeping, tufted, alpine herbs. Heads small, sessile . . . . .              | 13. RAOULIA.    |
| Erect or decumbent herbs. Scales of involucre with or without white rays . . . . . | 14. GNAPHALIUM. |
| Tufted, woolly, alpine herbs, with very broad sessile heads . . . . .              | 15. HAASTIA.    |

††† Herbs shrubs or trees. Involucral scales in 1 series. Ligulate fl. 0 or yellow.

- |   |                    |
|---|--------------------|
| Herbs. Outer florets tubular, excessively slender, female . . . . .         | 16. ERECHTITES.    |
| Outer florets ligulate or similar to interior. Pappus soft, white . . . . . | 17. SENECIO.       |
| Outer florets small, irregularly cleft . . . . .                            | 18. BRACHYGLOTTIS. |
| Ligulate fl. 0. Pappus very rigid, yellowish . . . . .                      | 19. TRAVERSIA.     |

## (3. CICHORACEÆ.)

Subord. 2. **Ligulifloræ**.—*Florets all ligulate. Herbs with milky juice.*

*Herbs with radical leaves and leafless 1-flowered scapes.*

- Achene not beaked. Pappus flattened, subulate . . . . . 20. MICROSERIS.  
 Achene not beaked. Pappus of soft, simple hairs . . . . . 21. CREPIS.  
 Achene mucronate upwards, beaked. Pappus plumose . . . . . 22. TARAXACUM.

*Branched leafy herbs.*

- Achene ribbed, compressed. Pappus plumose . . . . . 23. PICRIS.  
 Achene flat or winged. Pappus of simple, very soft hairs . . . . 24. SONCHUS.

## 1. OLEARIA, Mœnch.

(Eurybia, Cass.)

Shrubs or trees. Leaves alternate or fascicled, very rigid, coriaceous, with white or buff tomentum below.—Heads large or small, rayed, corymbose or solitary, peduncled or sessile. Involucre of imbricate, rigid scales. Receptacle convex, alveolate or almost even. Florets 20–100 (rarely 1–4); outer female, in one row, ligulate, white, the rest tubular, hermaphrodite; anthers with very short tails. Pappus of one or more rows of long, rigid, usually unequal, scabrid hairs, acute or thickened at the points. Achenes ribbed, terete, not flattened.

A very large New Zealand and Australian genus, which will possibly have to be united with some others of the Old or New World; most were included, by De Caudolle, under *Eurybia*, Cass., a genus established on the single pappus, but which cannot be separated from *Olearia*. The small N. Zealand section, having opposite pairs or fascicles of leaves, might (on account of its habit) be separated generically, were it not for intermediate Australian forms. The terete (not compressed) achene and short tails to the anther-cells, distinguish the genus from the Northern shrubby *Asters*; and the branched, shrubby or arboreous habit alone from *Celmisia* and *Pleurophyllum*. The three first species, or two of them, may prove varieties of one, as may the fourth and fifth of another.

I. *Leaves alternale, not fascicled.*

A. *Head solitary on a bracteale peduncle, 1–1½ in. diam.; florets 50–100. Rays large, long. Leaves very coriaceous, 2–5 in. long.*

- Leaves 2–4 in., closely obtusely toothed. Bracts imbricate . . . 1. *O. operina*.  
 Leaves 2–4 in., closely obtusely toothed. Bracts few, leafy . . . 2. *O. angustifolia*.  
 Leaves 1–2½ in., toothed towards the tip . . . . . 3. *O. semidentata*.

B. *Heads panicled, 1 in. diam.; florets 50–80, rays very short. Leaves broad, 2–5 in. long, very coriaceous, toothed.*

- Leaves acutely irregularly toothed . . . . . 4. *O. Colensoi*.  
 Leaves crenulate . . . . . 5. *O. Lyallii*.

C. *Head very large, solitary on a long naked peduncle; florets very numerous, rays short. Leaves 3–6 in., entire* . . . 6. *O. insignis*.

D. *Heads panicled, small, ½–¾ in. diam.; florets 8–20. Leaves 1½–4 in. long, oblong or ovate, coriaceous, entire, waved or toothed.*

- Leaves rather shining below, oblong, obtuse. Heads ½ in. long . . 7. *O. furfuracea*.  
 Leaves silvery below, oblong or ovate, acute, toothed. Heads ¼–½ in. long . . . . . 8. *O. nitida*.  
 Leaves silvery below, oblong, acute at both ends, toothed; veins diverging . . . . . 9. *O. dentata*.

- Leaves shining below, linear-oblong, spinous, truncate at the base 10. *O. ilicifolia*.  
 Leaves with soft white wool below, acute, toothed. Achenes  
 glabrous . . . . . 11. *O. Cunninghamii*.

E. *Heads solitary or corymbose, small,  $\frac{1}{8}$ – $\frac{1}{3}$  in. diam.; florets 10–20. Leaves less than 1 in. long, entire.*

- Leaves 1 in., flat. Heads corymbose; involucre closely imbricate 12. *O. Haastii*.  
 Leaves  $\frac{1}{3}$ – $\frac{2}{3}$  in., flat. Heads corymbose; involucre lax . . . 13. *O. moschata*.  
 Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in., convex. Head solitary . . . . . 14. *O. nummularifolia*.

F. *Heads corymbose, very narrow; florets 1–4. Leaves 1–3 in. long.*

- Leaves waved, oblong, obtuse, reticulate on both sides . . . 15. *O. Forsteri*.  
 Leaves lanceolate-oblong, acute, flat, reticulate on both sides . . 16. *O. avicenniæfolia*.  
 Leaves oblong, obtuse, waved, not evidently reticulate . . . 17. *O. albidula*.

II. *Leaves in opposite pairs or opposite fascicles,  $\frac{1}{8}$ –1 in. long.*

- Leaves  $\frac{1}{4}$ – $\frac{3}{8}$  in., pale below. Heads pedicelled . . . . . 18. *O. virgata*.  
 Leaves 1–2 in., obovate or oblong, grey and silvery below . . . 19. *O. Hectorsi*.  
 Leaves  $\frac{1}{8}$  in., linear, yellow below. Heads sessile . . . . . 20. *O. Solandri*.

1. ***O. operina*, Hook. f. Fl. N. Z. i. 114.** A stout branching shrub. Branches thick; leaves below and inflorescence covered with white tomentum. Leaves crowded, 2–4 in. long,  $\frac{1}{3}$ – $\frac{2}{3}$  broad, rigidly coriaceous, narrowly obovate-lanceolate, acuminate; teeth with obtuse, callous tips, glabrous above; veins almost obliterated beneath. Peduncles 2 in. long, stout, thickly clothed with imbricating, ovate-lanceolate bracts  $\frac{1}{3}$ – $\frac{1}{2}$  in. long; heads 1–1 $\frac{1}{2}$  in. diam. Corolla-tube of ray glabrous, of disk puberulous. Pappus hairs very unequal. Achene  $\frac{1}{4}$  in. long, ribbed, silky.—*Arnica operina*, Forst.

$\alpha$ . Branches as thick as a goose-quill, glabrous below. Flower of ray  $\frac{3}{8}$  in. long.

$\beta$ . Branches as thick as the finger, tomentose. Flower of ray very short.

Middle Island:  $\alpha$ , Dusky Bay, *Forster, Menzies*;  $\beta$ , Port Preservation, *Lyall*.

2. ***O. angustifolia*, Hook. f. Fl. N. Z. i. 115.** Very similar to *O. operina*,  $\beta$ , but the leaves much more attenuated, longer, with 3–5 distinct parallel ribs below, the teeth closer, and the peduncles bearing fewer leaf-like bracts, of which the upper are 1–2 in. long. The specimens are past flower.

Stewart's Island, *Lyall*.

3. ***O. semidentata*, Decaisne;—Fl. N. Z. i. 115.** A much more slender species than the preceding. Branches as thick as a crow-quill. Leaves 1 $\frac{1}{2}$ –2 $\frac{1}{2}$  in. long, narrow oblong- or linear-lanceolate, acute, serrate towards the tip, white below. Peduncles  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long, with few bracts; head 1 $\frac{1}{4}$  in. diam., purple? Achene  $\frac{1}{8}$  in. long, ribbed, almost glabrous.

Chatham Island, *Dieffenbach*. A beautiful plate of this plant was prepared by M. Decaisne, in 1845, for a work (hitherto unpublished) on the botany of the French expedition in the 'Venus.' The leaves are broader in the figure than in my specimens.

4. ***O. Colensoi*, Hook. f. Fl. N. Z. i. 115. t. 29.** A stout branching shrub. Leaves very thick and rigid, 1 $\frac{1}{2}$ –4 in. long, broadly oblong- or lanceolate-obovate, acute, acutely irregularly toothed, shining above, with thick buff or white tomentum beneath; ribs evident or obliterated below. Panicles 6–10-headed, bracteate. Heads  $\frac{1}{2}$  in. diam.; involucre scales linear, in 1 or 2 series,



scarious, villous at the tips. Ray florets very short. Pappus white, unequal, in several rows. Achene silky.

*α*. Leaves without obvious petioles, shorter than the panicles.

*β*. Leaves in distinct petioles, longer than the panicles.

**Northern** and **Middle** Islands: var. *α*, Mount Hikurangi, *Colenso*; mountains of Canterbury, *Haast*; var. *β*, Dusky Bay, *Lyall*.

5. **O. Lyallii**, *Hook. f. Fl. N. Z.* i. 116. A small, very robust tree, much resembling *O. Colensoi* and similarly clothed, but far more robust, the leaves very broadly elliptical or oblong, with diverging veins, obtusely crenulate, the panicles much stouter; involucre bracts in more series. Petioles very broad and thick.

**Lord Auckland's** Islands, *Lyall, Bolton*. A noble plant. I have the foliage of what is possibly the same, gathered by *Lyall* in Milford Sound, but the branch and petioles are more slender.

6. **O. insignis**, *Hook. f. Fl. N. Z.* ii. 331. A very robust and remarkable species. Branches as thick as the finger, very densely clothed with thick fulvous or reddish tomentum, as are the young leaves, old leaves below, petioles, peduncles, and involucre. Leaves 3–5 in. long, 2–3 broad, oblong, obtuse, quite entire, excessively thick and hard, unequal at the base, shining above; petiole  $\frac{1}{3}$ – $1\frac{1}{2}$  in. long. Peduncle as thick as a goose-quill, 6–10 in. long. Head hemispherical. Involucre scales in very many imbricating series, subulate-lanceolate, acuminate, with rigid, recurved, needle-like points, the outer obtuse. Florets excessively numerous, of ray with filiform pilose tubes,  $\frac{1}{2}$  in. long, and narrow short rays. Pappus rufous, of one series of equal scabrid hairs, thickened at their tips. Achene very slender, densely silky.

**Middle** Island: banks of the Waihopai, on the driest rocks, *Munro*; Awatere valley, *Sinclair*. A most magnificent plant, almost generically distinct from *Eurybia* in the simple pappus of equal hairs, thickened at the tip, but it approaches some Australian species in habit, size, and other respects.

7. **O. furfuracea**, *Hook. f.—Eurybia*, DC.; *Fl. N. Z.* i. 117. A small tree, 10–15 ft. high. Branches terete, velvety; twigs deeply grooved, and inflorescence and leaves below covered with closely-appressed matted hairs, producing a shining surface. Leaves  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. broad, ovate-oblong, obtuse, waved, rarely sinuate-toothed, rounded and unequal at base, reticulated above; petiole  $\frac{1}{2}$ –1 in. long. Corymbs large, branched, loose, spreading. Heads very numerous,  $\frac{1}{3}$  in. long,  $\frac{1}{6}$  diam.; involucre scales imbricate, oblong, obtuse. Florets longer than involucre, of ray 3 or 4 with short broad rays, of disk 6–8. Pappus white, outer hairs short. Achene slender, angled, puberulous, and glandular.—*Haxtonia furfuracea*, A. Cunn.; *Aster*, A. Rich.; *Shawia*, Raoul.

**Northern** Island: Bay of Islands to the east coast, *Banks and Solander*.

8. **O. nitida**, *Hook. f.—Eurybia*, *Fl. N. Z.* i. 117. A small tree, resembling *O. furfuracea*, but the tomentum is more silvery and shining, and leaves more ovate, less coriaceous, sinuate-toothed, and acute or acuminate. Heads in close, many-flowered, rounded corymbs, on silky pedicels,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, about as broad; involucre scales few, pilose, or laxly villous; florets 15–20,

rays short. Pappus unequal. Achene silky.—*Eurybia alpina*, Lindl. and Paxt. Mag.; *Solidago arborescens*, Forst., not A. Cunn.

Mountainous regions of the **Northern** Island, *Banks and Solander*, etc.: Mount Egmont, alt. 4000 ft., *Dieffenbach*; Tongariro and Ruahine range, *Colenso*. Abundant throughout the **Middle** Island.

9. **O. dentata**, Hook. f.—*Eurybia dentata*,  $\alpha$ , Fl. N. Z. i. 118. A shrub or small straggling tree, 20 ft. high, smelling of musk. Branches, panicles, and leaves below with very appressed down. Leaves oblong or linear-oblong, acute or acuminate, young pubescent above, 2–4 in. long, toothed and rather waved along the margins, not truncate at the base; veins at an obtuse angle to the midrib. Heads white, in large rounded or flattened, many-headed corymbs,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, broadly campanulate; involucre scales few, pubescent and pilose; florets 10–12, of ray short; pappus white or red, in one series, hairs thickened at tips. Achene short,  $\frac{1}{2}$  in. long, pilose and ribbed.

**Northern** Island: Ruahine range, *Colenso*. **Middle** Island: Otago, *Hector*. Wood streaked with yellow, makes fair veneers, *Buchanan*.

10. **O. ilicifolia**, Hook. f.—*Eurybia dentata*,  $\beta$ , Fl. N. Z. i. 118. Very similar to *O. dentata*, and also smelling of musk, but branches and twigs nearly glabrous. Leaves longer and narrower, usually truncate at the base, much and deeply waved at the margin, with spinous teeth, yellowish below when dry, and veins at right angles to the midrib. Heads as in *O. dentata*.

**Northern** Island: Tongariro, *Bidwill*; Ruahine range, *Colenso*. **Middle** Island: Haast river, Canterbury, *Haast*; Otago, *Lyall*; lake district, *Hector and Buchanan*. Certainly distinct from *O. dentata*, and remarkable for its yellow hue when dry, waved spinous leaves, and horizontal veins.

11. **O. Cunninghamii**, Hook. f.—*Eurybia*, Fl. N. Z. i. 117. t. 30. A small tree, 12–20 ft. high. Branches, panicles, petioles, and under surface of leaves covered with soft white or brown tomentum. Leaves 2–5 in. long, oblong ovate-oblong or lanceolate-oblong, acute, more or less toothed, finely reticulated above; veins diverging, but not at right angles. Heads very numerous, in large broad panicles with diverging branches, broadly campanulate,  $\frac{1}{4}$  in. diam.; involucre shortly turbinate, scales very woolly or nearly glabrous, obtuse or acute, much shorter than the florets; florets 12–20; rays few, broad; pappus white or reddish, unequal, rather thickened at the tips. Achene quite glabrous.—*Brachyglottis Rani*, A. Cunn.

**Northern** Island: not uncommon in woods, *Banks and Solander*, etc. **Middle** Island: Nelson, common, *Travers*; Ship Cove, *Lyall*. Very variable in size of foliage, in its toothings, and in the involucre sometimes of very tomentose obtuse scales, at others of nearly glabrous acute ones.

12. **O. Haastii**, Hook. f., n. sp. A small shrubby tree. Branches stout and corymbs hoary. Leaves  $\frac{2}{3}$ – $1\frac{1}{3}$  in. long, oblong or ovate-oblong, obtuse, very coriaceous, quite entire, reticulate and shining above, below white and smooth, with close appressed white down, not shining, flat; veins very obscure, at right angles to midrib. Heads in rather loose peduncled corymbs,  $\frac{1}{3}$  in. long,  $\frac{1}{5}$  in. diam., 10–15-flowered; involucre cylindric, scales closely imbricate, oblong, obtuse, glabrous, inner nearly as long as the florets; ray florets few, broad; pappus white, unequal. Achene loosely pilose.

**Middle Island**: near the glacier of Lake Okau, alt. 4-4500 ft., *Haast*. I received this plant first from the late Mr. Veitch, of Exeter, who cultivated it from seeds brought from New Zealand, bearing the MS. name *Eurybia parvifolia*.

13. **O. moschata**, *Hook. f., n. sp.* A much-branched shrub, smelling strongly of musk. Branches, peduncles, and leaves below covered with densely appressed, white or yellowish tomentum. Leaves  $\frac{1}{2}$ – $\frac{2}{3}$  in. long, narrow obovate-oblong, obtuse, quite entire, flat, narrowed into a very short petiole, hardly reticulated above; veins quite obsolete below. Corymbs axillary, long-peduncled. Heads few, long-pedicelled, campanulate,  $\frac{1}{4}$  in. diam.; involucrel scales in few series, outer short, obtuse, white, tomentose, inner brown; florets 12–20; pappus whitish, unequal. Achene silky.

**Middle Island**: Mount Cook, 2500–3500 ft., and banks of Haast and Hopkins rivers, *Haast*; Otago, lake district, alt. 2000 ft., *Hector and Buchanan*.

14. **O. nummularifolia**, *Hook. f.*—*Eurybia*, Fl. N. Z. i. 118. A rigid, erect shrub, 1–10 ft. high, more or less viscid. Branches stout, erect, often glutinous. Leaves close-set, erect spreading or reflexed,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, orbicular oblong or obovate, obtuse, quite entire, margins recurved, very hard and coriaceous, reticulate and shining above, below white or yellow, covered with appressed down. Heads solitary, on peduncles longer or shorter than the leaves,  $\frac{1}{2}$ – $\frac{1}{2}$  in. long,  $\frac{1}{3}$  broad; involucre turbinate, scales appressed, imbricate, broad, obtuse, nearly glabrous or the outer pubescent; florets 8–10, rays rather broad; pappus white, unequal. Achene pubescent.

Alps of the **Northern** and **Middle Islands**, alt. 4000 ft.: Tongariro, *Bidwill*; Mount Hikurangi, *Colenso*; Nelson, *Bidwill*; Southern Alps, in various places, *Sinclair*, *Haast*, *Travers*; Otago, lake district, *Hector and Buchanan*. Travers sends a variety from the Wairau gorge, alt. 4500 ft., with the margins of leaves so recurved that the latter are cymbiform, and the outer scales of the involucre are tomentose.

15. **O. Forsteri**, *Hook. f.*—*Eurybia*, Fl. N. Z. i. 119. A small tree, closely resembling *O. furfuracea* in habit and foliage. Leaves 2–3 in. long, oblong, obtuse, margins undulate, both surfaces finely reticulate, lower white with densely appressed down; petioles  $\frac{1}{2}$ –1 in. long. Corymbs shorter than the leaves, peduncled, spreading, many-headed. Heads fascicled and sessile on the branches of the panicle,  $\frac{1}{5}$ – $\frac{1}{6}$  in. long; involucre narrow, scales few, lax, coriaceous, shining, white, obtuse, nearly glabrous; florets 1 or 2, one often ligulate; pappus white, unequal. Achene pubescent.—*Shawia paniculata*, Forst.

**Northern and Middle Islands**, *Banks and Solander*, etc.; head of Ruamahanga and banks of the Pahawa river, *Colenso*; Akaroa, *Raoul*.

16. **O. avicenniæfolia**, *Hook. f.*—*Eurybia*, Fl. N. Z. i. 120. A small tree. Branches hoary. Leaves  $1\frac{1}{2}$ – $2\frac{3}{4}$  in. long, elliptic- or lanceolate-oblong, narrowed at both ends, subacute, margins flat, reticulate on both surfaces, white or rufous with closely appressed tomentum below; petioles  $\frac{1}{3}$ – $\frac{1}{2}$  in. long. Corymbs peduncled, densely very many-headed. Heads shortly pedicelled,  $\frac{1}{6}$  in. long, narrow; involucre cylindric, scales few, imbricate, coriaceous, glabrous, ciliate, not shining; florets 3 or 4, one with a broad ray; pappus white. Achene silky.—*Shawia avicenniæfolia*, *Raoul*, t. 13.

**Middle Island:** Akaroa, *Raoul*; Nelson, *Bidwill*; Southern Alps, *Haast*; Otago, lake district, *Hector and Buchanan*.

17. ***O. albidæ***, *Hook. f.*—*Eurybia*, Fl. N. Z. i. 118. A small tree, very like *O. Forsteri* in habit and foliage, but the leaves are not evidently reticulate on either surface, the under surface is rather softer and very white, the panicles larger, more effuse. Heads quite different, pedicelled,  $\frac{1}{5}$  in. long, subcylindric; involucre scales imbricate, short, obtuse, pubescent; florets 2 or 3, one often ligulate; pappus white, unequal. Achene pubescent.

**Northern Island,** *Colenso*; Auckland, *Sinclair*.

18. ***O. virgatæ***, *Hook. f.*—*Eurybia*, Fl. N. Z. i. 119. An erect, twiggy shrub, 3–8 ft. high. Branches opposite, angled or grooved, glabrous or pubescent. Leaves  $\frac{1}{4}$ – $\frac{3}{8}$  in. long, linear-oblong obovate or spatulate, obtuse, rarely quite linear, with white or fulvous tomentum beneath, veinless, margins flat or recurved. Heads solitary or fascicled, on short or long slender pedicels, rarely sessile, broadly campanulate,  $\frac{1}{4}$  in. diam.; involucre scales woolly, few, short; ray florets few; pappus white or reddish. Achene pubescent.

Var.  $\alpha$ . Leaves  $\frac{1}{4}$ –1 in., narrow linear-obovate, flat.

Var.  $\beta$ . Leaves  $\frac{1}{2}$  in., linear, margins recurved.

Var.  $\gamma$ . Leaves 1–1 $\frac{1}{2}$  in., excessively narrow linear, margins recurved.

**Northern Island,** var.  $\alpha$ , boggy places, Wairarapa, *Colenso*. **Middle Island,** var.  $\alpha$  and  $\beta$ , Wairau Pass, by watercourses, *Bidwill*; Rangitara river, *Sinclair*; Lake Titikapo and Wainaka, *Haast*; Otago, *Lindsay*. Var.  $\gamma$ , Otago, *Lindsay*; lake district, *Hector and Buchanan*. Very variable in size, breadth, and colour of foliage.

19. ***O. Hectori***, *Hook. f., n. sp.* Habit of *O. virgatæ*, but leaves 1–2 in. long, obovate, on slender petioles, membranous, covered below with pale-grey silvery tomentum, the veins distinct.

**Middle Island:** Otago, lake district, *Hector and Buchanan*, “a beautiful shrubby tree.” Possibly an extreme form of *O. virgatæ*, but a most distinct-looking plant.

20. ***O. Solandri***, *Hook. f.*—*Eurybia*, Fl. N. Z. i. 119. An erect shrub, 5 ft. high. Branches stout, upper opposite, angled, often viscid. Leaves in opposite pairs or fascicles,  $\frac{1}{6}$  in. long, uniform, narrow linear or linear-obovate, obtuse, margins recurved, covered with yellow tomentum below. Heads solitary, sessile,  $\frac{1}{4}$  in. long; involucre turbinate, scales numerous, short, imbricated, obtuse, fulvous; florets 8–10, ray short; pappus red, equal. Achene pubescent.

**Northern Island:** sandy shores of the east coast, *Banks and Solander, Cunningham*, etc. Habit of *Cassinia fulvida*.

## 2. PLEUROPHYLLUM, *Hook. f.*

Tall, succulent, robust, leafy, silky or woolly herbs. Leaves radical and cauline, with numerous stout parallel ribs.—Heads racemose. Involucre hemispherical, scales in 2 or 3 series, herbaceous. Receptacle flat, alveolate, toothed. Florets very numerous, of the ray in 1–3 series, ligulate, female; of the disk tubular, 4- or 5-toothed, hermaphrodite. Pappus of 2 or 3 series, rigid, scabrid, unequal. Anthers shortly tailed. Achene angled, densely setose.

The only species known are confined to the islets south of New Zealand, and are noble



plants. The genus is best distinguished from such *Olearias* as *O. Colensoi* by its herbaceous habit and ribbed leaves.

Heads with long, purple, 3-toothed rays . . . . . 1. *P. speciosum*.  
Heads with very short 2-3-partite rays . . . . . 2. *P. criniferum*.

1. ***P. speciosum***, *Hook. f. Fl. Antarct.* i. 31. t. 22, 23. Stem 2-3 ft. high; root thick, fleshy. Leaves villous with bristles intermingled, radical oblong, 1 ft. long, 6-8 in. broad, quite entire, ribs 18-20, cauline smaller. Raceme leafy, sometimes compound below. Heads 2 in. broad, very handsome, purple.

**Lord Auckland's** group and **Campbell's** Island, in wet places, *J. D. H.*

2. ***P. criniferum***, *Hook. f. Fl. Antarct.* i. 32. t. 24, 25. Stem 2-6 ft. high, sometimes branched at the base, covered at the base with the curled hair-like dry ribs of the old leaves. Radical and lower leaves silky-villous, 2 ft. long, 1 broad, amplexicaul at the base, broadly oblong, quite entire, ribs about 20-40, upper narrow, densely silky. Raceme simple. Heads subglobose; involucre scales ciliate-dentate, glabrous or tomentose.

**Lord Auckland's** group and **Campbell's** Island, in swampy places, *J. D. H.*  
**M'Quarrie's** Island, *Fraser*.

### 3. CELMISIA, Cass.

Perennial Aster-like herbs, with fusiform roots, or creeping branched rhizomes. Leaves all radical, rosulate, simple, entire or toothed, most frequently covered with more or less appressed white or buff tomentum. Scapes with linear bracts, 1-headed.—Heads large, rayed. Involucral scales in few or many series, linear or subulate, usually pubescent or cottony or glandular, often recurved. Receptacle plane or convex, even or deeply alveolate. Florets of ray *female*, in one series, with long spreading or revolute, white or purplish ligules; arms of style with linear obtuse even arms, thickened at the edges: of disk *hermaphrodite*, tubular, 5-toothed, tube often thickened below; anthers with very short tails; arms of style shorter, tipped with long or short glandular cones. Pappus of about 2 series of rather few, unequal, rigid, scabrid, white or reddish bristles, the outer shorter. Achene linear, often as long as the pappus, angled or terete, rarely compressed, glabrous or silky, the hairs usually bifid at the very tip.

A most beautiful genus, abundant in New Zealand, and, as in all the other large genera of these islands, the species are very variable, difficult to discriminate, and intermediate forms may be expected between those here described. It is very closely allied in characters but not in habit to the large northern genus *Erigeron*, and the minute obscure tails to the anthers is the only diagnostic mark; three South American *Erigerons*, indeed, have all the habits of *Celmisia*, they have, however, the anthers of *Erigeron*, in which genus Weddell has placed them. From *Aster*, the same characters of the anthers, and the rarely flattened achenes distinguish them. From *Olearia* and *Pleurophyllum*, they differ only in habit. Two of the New Zealand species, and another are Australian; the genus is unknown elsewhere.

A. *Leaves more or less toothed or serrate (often obscurely), white or buff beneath (glabrous in a var. of Sinclairii). Involucres generally viscid.*

Leaves 6-9 × 1½-2 in., acutely serrate, lanceolate . . . . . 1. *C. holosericea*.  
Leaves 3-6 × ¾-1½ in., crenate, narrow linear-oblong . . . . . 2. *C. densiflora*.

- Leaves  $\frac{1}{2}$ – $2\frac{1}{3} \times \frac{1}{4}$ – $\frac{1}{3}$  in., subserrate, linear or spatulate, coriaceous, white below . . . . . 3. *C. discolor*.
- Leaves  $1\frac{1}{2}$ – $2 \times \frac{1}{2}$ – $\frac{3}{4}$  in., crenate-serrate, obovate-oblong, buff below. Achene silky . . . . . 4. *C. hieracifolia*.
- Leaves  $1-2 \times \frac{1}{2}$ – $\frac{1}{2}$  in., obovate-oblong or spatulate, white below, margins recurved. Bracts many. Achene glabrous . . . . . 5. *C. Haastii*.
- Leaves  $1-2 \times \frac{1}{2}$ – $\frac{3}{4}$  in., serrulate, coriaceous, obovate, with white, soft tomentum below . . . . . 6. *C. incana*.
- Leaves  $2-2\frac{1}{2} \times \frac{1}{2}$  in., scarcely serrate, linear-oblong. Rays distant, corolla-tube rigid . . . . . 7. *C. Lindsayi*.
- Leaves  $1\frac{1}{2}$ – $2 \times \frac{1}{3}$ – $\frac{2}{3}$  in., scarcely serrate, oblong or spatulate, membranous . . . . . 8. *C. Sinclairii*.
- B. Leaves  $3-18 \times \frac{1}{3}$ – $3$  in., quite entire (obscurely toothed or rough in *C. verbascifolia*, spectabilis, and petiolata), silvery silky or woolly below (glabrate in *C. Mackau*).
- Leaves  $4-8 \times \frac{1}{3}$ – $3$  in., oblong or lanceolate, not silvery below. Achene glabrous . . . . . 9. *C. verbascifolia*.
- Leaves  $10-18 \times \frac{1}{2}$ – $2\frac{1}{2}$  in., lanceolate, silky below. Achene pilose . . . . . 10. *C. coriacea*.
- Leaves  $10 \times 1\frac{1}{2}$  in., narrow lanceolate, glabrate on both sides . . . . . 11. *C. Mackau*.
- Leaves  $3-5 \times \frac{1}{3}$ – $\frac{2}{3}$  in., linear, silvery above, shining below . . . . . 12. *C. Munroi*.
- Leaves  $8-18 \times \frac{1}{4}$ – $\frac{3}{4}$  in., ensiform, even and glabrous above, silvery below . . . . . 13. *C. Lyallii*.
- Leaves  $3 \times \frac{1}{4}$  in., linear, obtuse, viscos above, grooved below . . . . . 14. *C. viscosa*.
- Leaves  $6-12 \times \frac{3}{4}$ – $1\frac{1}{2}$  in., linear-oblong, with long purple sheaths . . . . . 15. *C. petiolata*.
- Leaves  $4-6 \times \frac{1}{2}$ – $1$  in., linear-lanceolate, with opaque, thick, buff, loose tomentum below . . . . . 16. *C. spectabilis*.
- Leaves  $9 \times 1\frac{1}{2}$  in., oblong, and scape and head, with dense velvety, rusty tomentum below . . . . . 17. *C. Traversii*.
- C. Leaves  $1-12 \times \frac{1}{10}$ – $\frac{1}{4}$  in., very narrow-linear or linear-oblong, white below, or on both sides.
- Leaves  $2-18 \times \frac{1}{10}$ – $\frac{1}{4}$  in., narrow, margins recurved, cottony and silvery . . . . . 18. *C. longifolia*.
- Leaves  $\frac{1}{2}$ – $1 \times \frac{1}{10}$  in., acerose, pungent, silvery . . . . . 19. *C. laricifolia*.
- Leaves  $\frac{1}{2}$ – $\frac{3}{4} \times \frac{1}{8}$ – $\frac{1}{4}$  in., linear-spatulate, silky on both sides . . . . . 20. *C. Hectori*.
- Leaves  $\frac{1}{2}$ – $\frac{3}{4} \times \frac{1}{12}$  in., shortly silky on both sides. Head sessile . . . . . 21. *C. scssiliiflora*.
- D. Leaves perfectly glabrous on both surfaces, or with minute glandular pubescence only. (Sec 8, Sinclairii, in A, and 11, Mackau, in B.)
- Leaves  $\frac{1}{2} \times \frac{1}{8}$  in., obtuse, green, quite entire . . . . . 22. *C. bellidioides*.
- Leaves  $\frac{3}{4}$ – $1 \times \frac{1}{3}$  in., spatulate, acute, serrate . . . . . 23. *C. glandulosa*.
- Leaves  $1-4 \times \frac{1}{8}$ – $\frac{1}{4}$  in., linear, curved, coriaceous, shining . . . . . 24. *C. vernicosa*.

1. **C. holosericea**, Hook. f. *Fl. N. Z.* i. 121. t. 31. Leaves 6–9 in. long,  $1\frac{1}{2}$ –2 broad, flat, leathery, lanceolate, acute, acutely serrate, quite glabrous above, with fine, nearly parallel veins, covered below with a thin layer of white appressed tomentum, except the midrib; petiolar part broadly sheathing, 1 in. long and broad, furrowed, quite glabrous, shining, margins membranous. Scape 1– $1\frac{1}{2}$  ft. long, slender, glabrous, with linear bracts 1 in. long. Head 2– $3\frac{1}{2}$  in. broad; involueral scales in many series, subulate, outermost leafy, the rest glabrous or viscid, with recurved tips; florets glabrous; ray narrow,  $\frac{3}{4}$ –1 in. long; pappus  $\frac{1}{6}$  in. long, as long as the pilose achene.—*Aster holosericeus*, Forst.

Middle Island: Dusky Bay, Forster; Port Preservation, Lyall. A magnificent plant.

2. **C. densiflora**, Hook. f., n. sp. Leaves 3–6 in. long,  $\frac{2}{3}$ – $1\frac{1}{3}$  broad, narrow linear-oblong, obtuse, flat, leathery, crenate-dentate, quite glabrous but viscid above, below covered (except the midrib) with appressed white

tomentum; veins 0; petiolar part  $1-1\frac{1}{2}$  long,  $\frac{3}{4}$  broad, sheathing, glabrous, grooved, shining. Scape 8-12 in. long, slender, with few linear bracts 1 in. long. Head 1-2 in. broad; involueral scales excessively numerous, subulate, recurved, pubescent and viscid; florets densely crowded, glabrous; rays twisted, numerous,  $\frac{1}{6}-\frac{1}{2}$  in. long, narrow; pappus  $\frac{1}{6}$  in. long, as long as the slender rather silky achene.

**Middle Island:** mountains near Lake Okau, Dobson's and Hopkin's rivers, alt. 2-5000 ft., *Haast*; Otago, lake district, subalpine, *Hector and Buchanan*. The excessively numerous florets and involueral scales (with recurved tips), short rays, and obtuse crenate leaves, well distinguish this.

3. **C. discolor**, *Hook. f. Fl. N. Z. i. 123*. A rather small species, 4-12 in. high. Leaves imbricating upon short branches, from oblong-spathulate to linear, the former  $1-1\frac{1}{2}$  in. long by  $\frac{1}{3}$  broad, the latter 2 in. long by  $\frac{1}{4}$  broad, sometimes with slender petioles, obtuse or subacute, serrulate to the touch or quite entire, opaque, glabrous or hoary above, white below, coriaceous. Scape slender, viscid; bracts many, linear. Head  $\frac{3}{4}$  in. diam.; involueral scales in few series, linear-subulate, recurved, viscid, pubescent or tomentose; rays narrow; pappus  $\frac{1}{6}$  in. long. Achene silky.

**Middle Island:** abundant on the mountains between 2000 and 6000 ft., from Nelson to Milford Sound. The var.  $\beta$  of *Fl. N. Z.* is clearly a large form. Some states approach *C. incana* in the softness and laxity of the wool.

4. **C. hieracifolia**, *Hook. f. Fl. N. Z. i. t. 34 B*. Closely allied to *C. discolor*, of the same size, but the branches are much shorter, the leaves  $1\frac{1}{2}-2$  in. long,  $\frac{1}{2}-\frac{3}{4}$  in. broad, obovate-oblong, sessile, obtuse, obtusely serrate, less coriaceous, with appressed buff (when dry) tomentum beneath. Scape stout, very pubescent and viscid, with many rather leafy, erect or recurved bracts not white below. Head as in *discolor*, but rather larger.

**Middle Island:** Nelson mountains, *Bidwill, Munro*. Very near *C. discolor*, but I think distinct.

5. **C. Haastii**, *Hook. f., n. sp.* Size and habit of *C. hieracifolia*, the leaves similar in dimensions form and texture, pale yellow-green above when dry, white with closely appressed tomentum below, margins narrowly recurved, with a few distant obscure teeth or stout bristles. Scape stout, cottony, covered with linear obtuse or acute cottony or glabrate bracts. Head  $\frac{2}{3}-1$  in. diam. Involueral scales linear, obtuse, hoary, membranous, erect, appressed, hardly glandular; rays  $\frac{1}{3}$  in. long. Achene glabrous.

**Middle Island:** Hopkins River and Mount Darwin, alt. 4500-6000 ft., *Haast*; Otago, lake district, alpine, *Hector and Buchanan*. Near *C. hieracifolia* and *incana*, but differing wholly in the stout cottony scape, numerous bracts, linear membranous not recurved involucre-scales, and glabrous achene.

6. **C. incana**, *Hook. f. Fl. N. Z. i. 123. t. 34 A*. Robust, 4-10 in. high, branches from the rooting rhizome short, stout, densely clothed with fibrous leaf-remains. Leaves crowded, 1-2 in. long,  $\frac{1}{2}-\frac{3}{4}$  broad, oblong-spathulate, obtuse or acute, densely coriaceous, serrulate, thickly covered below or on both surfaces with snow-white soft, not appressed tomentum. Scapes stout, numerous, linear; bracts woolly. Heads 1 in. diam.; involueral scales linear or subulate-lanceolate, recurved, pubescent and viscid; rays numerous, narrow; pappus  $\frac{1}{3}$  in. long. Achene silky.

**Northern Island:** Mount Hikurangi and Ruahine range, *Colenso*. **Middle Island:** Upper Wairau, *Sinclair*; top of Gordon's Nob and Macrae's Run, alt. 4-5000 ft., *Munro*; Otago, lake district, *Hector and Buchanan*. Generally a very distinct species, at once distinguished by the size, soft, loose, snow-white tomentum, and very coriaceous serrate leaves, but I fear it may pass into *C. discolor*.

7. **C. Lindsayi**, *Hook. f., n. sp.* Rhizome creeping, as thick as a quill, clothed with coriaceous, glabrous, short leaf-sheaths. Leaves 2-2½ in. long, ½ in. broad, linear-oblong, subacute, with a few small serratures, snow-white below with appressed shining tomentum, midrib black, cottony towards the short sheath, opaque and glabrous above. Scape slender, flexuous, nearly glabrous. Head 1½ in. diam.; involucre scales subulate, imbricate, glabrous, short; rays patent, few, distant, not recurved, ½ in. long; tube of corolla much thickened, rigid; pappus red, ¼ in. long. Achene silky.

**Middle Island:** Otago, Trap Cliffs at Shaw's Bay, the Nuggets, mouth of the Clutha river, *Lindsay*. A very distinct species, remarkable for the slender, flexuous, glabrous scape, small imbricate involucre, few straight distant rays, and much thickened, rigid corolla-tubes.

8. **C. Sinclairii**, *Hook. f., n. sp.* Rhizome long, as thick as a quill. Leaves 1½-2 in. long, ⅓-⅔ in. broad, linear-oblong or obovate-spathulate, obtuse or acute, obscurely toothed, glabrous on both sides, or white below, membranous, contracted into membranous, glabrous or hoary sheaths 1 in. long. Scape slender, nearly glabrous. Head 1-1¼ in. diam.; involucre scales subulate, squarrose, recurved, pilose; rays numerous, ⅓ in. long; pappus whitish, ½ in. Achene silky.

**Middle Island:** Dun mountains, *Sinclair* (leaves white below); Tarndale, *Sinclair* (leaves glabrous on both surfaces). Leaves more membranous than usual in the genus. I have only three specimens.

9. **C. verbascifolia**, *Hook. f. Fl. N. Z. i. 121*. Very large. Root thicker than the thumb, spindle-shaped. Leaves oblong or lanceolate, narrowed into very broad, purple, glabrous, sheathing petioles, with woolly edges, 4-8 in. long, 1½-3 broad, coriaceous, scarcely crenulate, opaque, glabrous above, below thickly clothed with pale, buff, loose, soft, thick tomentum; veins diverging. Scapes as long as the leaves, and heads densely woolly; bracts long, linear. Head 2 in. diam.; involucre scales erect, linear-subulate; tube of corolla much thickened below; rays very slender, ¾ in. long; pappus ¼ in. long. Achene glabrous, ripe not seen.

**Middle Island:** Milford Sound and Port Preservation, *Lyall*. A splendid species.

10. **C. coriacea**, *Hook. f. Fl. N. Z. i. 121*. Leaves 10-18 in. long, ½-2½ broad, lanceolate, coriaceous, narrowed into broad woolly sheaths, covered above with a silvery pellicle of matted cottony hairs, below with dense white silvery tomentum. Scapes very stout, very cobwebby and cottony, with many linear bracts. Head 1½-3 in. diam.; involucre scales very numerous, linear-subulate, cottony or glabrous; rays excessively numerous, 1½ in. long; tube of corolla pubescent. Achene linear, compressed, ¼ in. long, pilose.—*Aster coriaceus*, Forst.

**Middle Island:** abundant in the mountains, from Nelson to Dusky Bay, *Forster*, etc. Not hitherto found in the Northern Island, the plant alluded to in the *Fl. N. Z.*, as from the



Ruabine range, proves to have been found in the Middle Island. "Leather plant" of colonists. A magnificent species, which Mueller appears to have found in the Australian alps, but his specimens not being in flower, I cannot well determine the point.

11. **C. Mackaii**, *Raoul, Choix*, xix. t. 18 ;—*Fl. N. Z.* i. 122. Altogether similar to *C. coriacea*, but the mature leaves are glabrate on both sides, rather glaucous below, sparingly cottony at the base only; the scape and involucre also glabrate, the achene quite glabrous, and the tube of the corolla thickened at the base as in *C. verbascifolia*.

**Middle Island**: rocky places at Akaroa, *Raoul*.

12. **C. Munroi**, *Hook. f., n. sp.* Leaves 3–5 in. long,  $\frac{1}{3}$ – $\frac{2}{3}$  broad, narrow linear-oblong, strict, subacute, very coriaceous, with a silvery pellicle of matted cottony hairs above, below with dense white silvery tomentum, wrinkled in parallel lines when dry; margins slightly recurved; sheaths densely woolly and snow-white. Scape longer than the leaves, stout, very woolly and cottony; bracts numerous, linear. Head 1–1 $\frac{1}{2}$  in. diam.; involucre scales numerous, linear-subulate, erect or recurved, woolly or glabrate; rays very numerous,  $\frac{3}{4}$  in. long; pappus  $\frac{1}{2}$  in. long. Achene glabrous or hispidulous.

**Middle Island**: Upton Downs, Awatare, elev. 1500 ft., *Munro*; Hopkins River, Mount Cook, and elsewhere in the alps of Canterbury, 3–4500 ft., *Travers and Haast*. Best distinguished from *C. coriacea* by the narrow, smaller, linear, longitudinally wrinkled leaves. *Munro's* specimens have quite glabrous achenes, *Haast's* are hispidulous.

13. **C. Lyallii**, *Hook. f., n. sp.* Leaves 8–18 in. long,  $\frac{1}{4}$ – $\frac{3}{4}$  broad, narrow ensiform, gradually tapering from a silky sheathing grooved base to the tip, very rigidly coriaceous, quite smooth glabrous and even above, below with dense appressed white tomentum, even or grooved, tip tapering, rigid, pale yellow when dry. Scape densely cottony; bracts rather rigid, linear. Head 1 $\frac{1}{4}$ –1 $\frac{3}{4}$  in. diam.; involucre scales subulate-lanceolate, rigid, rather recurved, glabrous or cottony at the margins; rays twisted,  $\frac{1}{2}$  in. long; pappus  $\frac{1}{4}$  in. long. Achene pubescent or silky.

**Middle Island**: Dusky Bay, *Lyall*; Hurumui valleys, 1200–1600 ft., *Travers*. Abundant in the Rangitata, Two-thumb, and Malvern ranges, alt. 3–5000 ft., and alps of Hopkins River, alt. 2500 ft., *Sinclair and Haast*; Otago, lake district and Lindis Pass, displacing the tussock grass at 4000 ft., *Hector and Buchanan*. A well-marked species, best distinguished by the very long, narrow, rigid leaves, which gradually taper from base to tip, and are usually grooved with parallel ribs beneath.

14. **C. viscosa**, *Hook. f., n. sp.* Rhizome very stout, together with leaf-sheaths, 1 in. diam. Leaves crowded, 3 in. long,  $\frac{1}{4}$  broad, exactly linear, obtuse, sessile on the broader, glabrous, grooved, brown, short sheaths, very rigid, even or grooved above, white with appressed down beneath and ridged with parallel ribs. Scapes much longer than leaves, stout; bracts numerous, pubescent and viscid. Head 1 $\frac{1}{2}$  in. diam.; involucre scales numerous, subulate, woolly and viscid; rays short, revolute; pappus  $\frac{1}{4}$  in. long. Achene silky.

**Middle Island**: summit of Mount Torlesse, alt. 5–6000 ft., *Haast*; Otago, lake district, subalpine, *Sinclair and Haast*. The short, linear, rigid, entire, viscid leaves, which are white and ribbed below, and viscid scape, are the best marks of this species; it approaches states of *C. discolor*, but is much larger.

15. **C. petiolata**, *Hook. f., n. sp.* Leaves with the long purple hairy grooved petiole 6–12 in. long,  $\frac{3}{4}$ – $1\frac{3}{4}$  broad; blade linear-oblong or oblong-lanceolate, subacute, hairy or loosely villous above, greenish-white, with villous appressed tomentum below, membranous; midrib purple below; veins slender, diverging; margins entire or denticulate. Scapes longer than the leaves, hairy or villous, often purple; bracts slender. Head  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. diam.; involucrel scales narrow, subulate, tomentose or glabrate; rays  $\frac{1}{2}$  in. long; pappus  $\frac{1}{4}$  in. long. Achene glabrous or silky.

**Middle Island**: Hurrumui mountains, in moist valleys, alt. 3000 ft., *Travers*; Hopkin's River and Great Clyde glacier, alt. 2–6000 ft., *Haast*; Rangitata river, alt. 1800 ft., *Sinclair*; Mount Brewster, alt. 4–5000 ft., *Hector*. The long purple petioles and purple midrib of the rather membranous leaf, are constant characters in all my specimens.

16. **C. spectabilis**, *Hook. f. Fl. N. Z. i. 122. t. 33.* Rhizome very stout, together with leaf-sheaths  $1$ – $1\frac{1}{2}$  in. diam. Leaves 4–6 in. long,  $\frac{1}{2}$ –1 broad, narrow linear-oblong, obtuse or acute, sessile on the long, excessively silky and shaggy sheaths, glabrous and even, young silvery above, densely clothed with soft, loose, buff tomentum below, very thick and coriaceous; margins recurved, sometimes obscurely toothed. Scape stout, much longer than leaves, densely cottony; bracts linear. Head  $1$ – $1\frac{1}{2}$  in. broad; involucrel scales subulate, recurved, densely woolly; rays short, narrow, very numerous; tube of corolla thickened below; pappus nearly  $\frac{1}{3}$  in. long. Achene quite glabrous.

**Northern Island**: Tongariro, *Bidwill*; Mount Hikurangi and Ruahine range, *Colenso*. Abundant throughout Nelson and Canterbury provinces of the **Middle Island**, alt. 2–5000 ft. The rather short, rigid leaves, covered below with loose, not appressed, buff, woolly tomentum, and glabrous achenes, are the best characters of this species, which varies extremely in stature; very dwarf varieties are common.

17. **C. Traversii**, *Hook. f., n. sp.* Leaves beneath margins and scape most thickly clothed with soft, velvety, rusty-brown (when dry) tomentum. Leaves with petiole 9 in. long,  $1\frac{1}{2}$  broad, oblong-lanceolate, obtuse, coriaceous, glabrous and opaque above, except the silky midrib, below purple, dilating into the broad petiolar sheath, which is densely clothed with snow-white cotton. Scape very stout; bracts linear. Head  $1\frac{1}{2}$  in. diam.; involucrel scales very numerous, linear, acute, densely clothed with brown velvety tomentum; rays narrow, rather short,  $\frac{1}{2}$  in. long; pappus  $\frac{1}{4}$  in. Achene glabrous.

**Middle Island**: Discovery Peaks, Nelson, alt. 5500 ft., *Travers*. I have but one scape and two leaves of this very remarkable and handsome plant, the dense, rusty, velvety tomentum of scape and leaf below, contrasting with the snow-white cotton of the sheaths, are most singular and beautiful features.

18. **C. longifolia**, *Cass.*;—*C. gracilentia*, *Fl. N. Z. i. 122.* Leaves usually very numerous, 1–18 in. long,  $\frac{1}{10}$ – $\frac{1}{4}$  in. broad, narrow-linear or narrow-lanceolate, acute or acuminate, not pungent, upper surface glabrous or silvery, under silky-tomentose, margins often much recurved or revolute, rather soft and flexuose, never rigidly coriaceous. Scapes slender, cottony; bracts linear. Head  $\frac{1}{2}$ – $1\frac{1}{4}$  in. broad; involucrel scales subulate, glabrous or cottony, acute or obtuse, never recurved in flower, black at tip; rays few or many, long or short, broad or narrow; pappus reddish or white. Achene glabrous or silky.

Abundant throughout the islands, ascending to 5500 ft., and varying excessively in stature, robustness, length, and breadth of leaves, one or many (8-12) slender or robust scapes, and large or small, cottony or glabrate heads. This is the commonest *Celmisia* in the islands, and is also found on the Australian and Tasmanian alps and Blue Mountains. Some states almost pass into *C. Munroi*.

19. **C. laricifolia**, *Hook. f. Fl. N. Z.* ii. 331. A small species, with prostrate rhizomes, densely leafy for 2-3 inches. Leaves densely crowded,  $\frac{1}{2}$ -1 in. long, by  $\frac{1}{16}$  broad, acerose, pungent, somewhat recurved, glabrous above, silvery or cottony below; margins recurved. Scapes very slender, 2-4 in. long, glabrate; bracts few, setiform. Head  $\frac{1}{3}$  in. diam.; involucre scales few, linear-subulate, erect, cottony; florets few. Achene hispid.

**Middle Island**: Gordon's Nob and other Nelson mountains, alt. 4000 ft., *Munro, Sinclair*; summit of Mount Torlesse, alt. 4500-6000 ft., *Haast*.

20. **C. Hectori**, *Hook. f., n. sp.* A densely tufted species, forming extensive patches. Leaves densely imbricate, spreading,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long,  $\frac{1}{6}$ - $\frac{1}{4}$  broad, linear- or spatulate-oblong, obtuse, silky on both surfaces; margins recurved; sheaths short, coriaceous, shining, glabrous, cottony at the margins. Scape very robust, 4-5 in. long, villous and silky; bracts many, linear. Head large for the plant, 1 in. diam.; involucre scales linear-subulate, few, obtuse, pubescent; rays  $\frac{1}{3}$  in., long, rather broad; pappus  $\frac{1}{6}$  in. long. Achene silky.

**Middle Island**: Otago, Mount Brewster, alt. 5-6000 ft., *Hector and Buchanan*. A very pretty and distinct little species, remarkable for the small foliage and large head.

21. **C. sessiliflora**, *Hook. f., n. sp.* A small, robust, densely tufted, greenish-grey species, 2-3 in. high. Leaves most numerous and densely tufted,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long,  $\frac{1}{12}$  in. broad, strict, narrow-linear, obtuse, thick, convex at the back, equally hoary or silky on both surfaces; sheath as long and rather broader than the blade, membranous, with villous margins. Head  $\frac{2}{3}$  in. diam., sunk amongst the leaves; involucre scales few, slender, subulate; florets few; rays  $\frac{1}{3}$  in. long; pappus white or reddish,  $\frac{1}{4}$  in. long. Achene silky.

**Middle Island**: Upper Wairau, etc., 4000 ft., *Sinclair*; Discovery Peaks, 5800 ft., *Travers*; grassy flats, Mount Cook and Macaulay river, 4000 ft., *Haast*; Mount Brewster, and elsewhere in the lake district, 3-5000 ft., *Hector and Buchanan*.

22. **C. bellidioides**, *Hook. f., n. sp.* A small glabrous species. Rhizome creeping, branched, often stout and woody. Leaves spreading, linear-oblong,  $\frac{1}{3}$ - $\frac{2}{3}$  in. long,  $\frac{1}{8}$ - $\frac{1}{6}$  broad, linear-oblong or linear-spatulate, rounded at the tip, green on both surfaces; margin sometimes obscurely toothed, rather coriaceous, veinless, narrowed into short, rather cottony petioles. Scape slender, 1-2 in. high; bracts many, leafy, narrow. Head  $\frac{3}{4}$  in. diam.; involucre scales few, green, often purple-margined, broadly linear; rays many,  $\frac{1}{3}$  in. long; pappus  $\frac{1}{4}$  in. long; corolla-tube pilose. Achene villous or silky.

**Middle Island**: Tarndale mountains, in loose shingle, alt. 5000 ft., *Sinclair*; fissures of rocks, Mount Torlesse, Macaulay and Hopkins rivers, Lake Hawai, etc., alt. 3-6000 ft., *Haast*.

23. **C. glandulosa**, *Hook. f. Fl. N. Z.* i. 124. A small glabrous plant, 1-3 in. high, covered with minute and glandular pubescence. Leaves  $\frac{3}{4}$ -1 in. long,  $\frac{1}{3}$  in. broad, petioled, ovate- or oblong-spatulate, acute, acutely serrate

or toothed; petioles dilating into very short sheaths, rigid but thin. Scape slender; bracts few, linear, acuminate. Head  $\frac{3}{4}$  in. diam.; involucre scales linear-subulate, erect or recurved, pubescent and ciliate; receptacle deeply alveolate; rays few,  $\frac{1}{4}$  in. long; pappus  $\frac{1}{6}$  in. long. Achene silky.

**Northern Island:** base of Tongariro, *Colenso*. **Middle Island:** Mount Cook, alt. 5-6000 ft., *Haast*.

24. **C. vernicosa**, *Hook. f.*; *Fl. Antarct.* i. 34. *t.* 26 and 27. A densely tufted, very leafy, perfectly glabrous species, everywhere polished and shining. Leaves excessively densely crowded, rosulate, straight or curved, 1-4 in. long,  $\frac{1}{6}$ - $\frac{1}{4}$  broad, linear, obtuse, extremely coriaceous, convex above, sometimes obscurely toothed; margins often recurved. Scapes solitary or numerous, very stout, flexuose, 1-8 in. high, covered with leafy coriaceous bracts. Head 1-1 $\frac{1}{2}$  in. diam.; involucre scales linear, erect; rays numerous,  $\frac{1}{3}$ - $\frac{1}{2}$  in. long; disk purple; corolla-tube pilose; pappus  $\frac{1}{6}$  in. long. Achene hispid.

**Lord Auckland's group** and **Campbell's Island**: common from the sea to 1000 ft., *J. D. H.* A most beautiful plant, quite unlike any hitherto found in New Zealand proper.

#### 4. VITTADINIA, A. Rich.

Herbs or undershrubs, branched, leafy. Heads on the ends of the branches, their characters those of *Celmisia*, but involucre obconic; achene compressed, very slender; rays short, and anthers not tailed.

A small genus, confined to Australia, Tasmania, New Zealand, and the Sandwich Islands.

1. **V. australis**, *A. Rich.*;—*Eurybiopsis australis*, DC.;—*Fl. N. Z.* i. 125. A small, much branched, more or less pubescent, hispid and glandular herb, 6-12 in. high, with a short, woody rhizome, and erect, leafy, slender branches. Leaves  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, cuneate or linear-spathulate, 3-5-lobed or -toothed at the tip. Heads solitary, short-peduncled; involucre scales few, in two series, linear, rigid, erect; rays one series, white tipped with pink; pappus white or reddish,  $\frac{1}{4}$  in. long. Achene not so long as pappus, linear, compressed, hispid, hairs forked at the tip.

Common in dry places throughout the islands, from Auckland southwards, Wairau gorge, alt. 4-5000 ft., *Travers* (a very tomentose form); in Otago it ranges from the sea-level to the snow-ranges, *Hector* and *Buchanan*.

#### 5. LAGENOPHORA, Cass.

Small perennial herbs. Leaves oblong or spathulate, usually membranous. Scapes single-headed.—Involucre of two series of narrow, appressed, acute scales. Receptacle rather broad, naked. Florets many, of ray in one series, female not yellow, with revolute ligule, and compressed, beaked, often glandular achene: of disk tubular, 5-toothed; achene often imperfect; pappus 0.

A small genus, found in Australia, Tasmania, India, China, and extratropical S. America.

Petioles slender. Leaves hairy or glabrate. Heads $\frac{1}{3}$ - $\frac{1}{2}$ in. . . . .	1. <i>L. Forsteri</i> .
Petioles slender. Leaves hairy or glabrate. Heads $\frac{1}{6}$ - $\frac{1}{4}$ in. . . . .	2. <i>L. petiolata</i> .
Petioles short. Leaves hirsute. Achenes glabrous . . . . .	3. <i>L. lanata</i> .
Petioles broad. Leaves hirsute, pinnatifid. Achenes viscid . . . . .	4. <i>L. pinnatifida</i> .



1. **L. Forsteri**, DC.;—*Fl. N. Z.* i. 125. A small, glabrous pilose or hirsute, daisy-like, slender plant. Leaves with the slender petiole  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, blade  $\frac{1}{2}$ –1 in., obovate- or orbicular-oblong, obtuse, crenate toothed or lobed towards the base. Scape slender, 2–6 in. long, with few minute linear bracts, or 0. Head  $\frac{1}{8}$ – $\frac{1}{2}$  in. diam.; involucre scales linear, acute, appressed, with hyaline margins, outer sometimes recurved; rays very numerous, short, revolute. Achene  $\frac{1}{4}$  in. long, much compressed, edges thick, narrowed suddenly into a short, hardly viscid beak.—*Calendula pumila*, Forster; *Microcalia australis*, A. Rich.

Abundant throughout the islands, *Banks and Solander*, etc.

2. **L. petiolata**, Hook. f. *Fl. N. Z.* i. 125. In all respects like *L. Forsteri*, but the heads are very much smaller, only  $\frac{1}{6}$ – $\frac{1}{4}$  in. diam., with much fewer florets, smaller rays, and more viscid achenes.

Common throughout the islands, ascending to 4000 ft. **Kermadec** Islands, *M'Gillivray*. **Auckland** Island, *Bolton*. A variety, I suspect, of *L. Forsteri*.

3. **L. lanata**, A. Cunn.;—*Fl. N. Z.* i. 126. Hirsute and tomentose. Leaves obovate or obovate-spathulate, narrowed into very short petioles,  $\frac{1}{2}$ –1 in. long, obtusely coarsely crenate-dentate. Scapes very slender, glabrous, 2–5 in. long, naked. Heads as in *L. petiolata*, but achenes glabrous.

**Northern** Island: Bay of Islands, etc., common on dry grassy hills. Very similar to *L. hirsuta*, Poepp., of Chili.

4. **L. pinnatifida**, Hook. f. *Fl. N. Z.* i. 126. Hirsute. Leaves 2–4 in. long, narrow obovate-oblong or spathulate, narrowed into long broad petioles, deeply obtusely crenate-lobate or pinnatifid. Scapes 4–10 in. high, slender, pilose. Heads  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam.; involucre scales as in *L. petiolata*. Achene viscid.

**Northern** Island: east coast, *Colenso*; **Auckland**, *Sinclair*. **Middle** Island: Canterbury, *Sinclair and Haast*; Otago, *Lindsay*. Probably a form of the Australian *L. Biltardieri*.

## 6. BRACHYCOME, Cass.

Scapigerous, perennial small herbs. Leaves chiefly radical, spreading.—Heads with one series of rayed female, and numerous tubular hermaphrodite florets. Receptacle convex, naked, papillose. Involucre scales in 1 series, appressed, oblong-linear. Corolla of ray white blue or purplish, revolute; of disk 5-toothed. Pappus of very short bristles or 0. Achene compressed, without beak.

A large Australian and Tasmanian genus, closely allied to the European Daisy.

Leaves all radical, entire or lobed. Scapes with 1 head . . . . . 1. *B. Sinclairii*.  
Leaves radical and cauline, lobulate. Heads terminating branches . . . . . 2. *B. odorata*.  
Leaves all radical, pinnatifid. Scapes with 1 head . . . . . 3. *B. pinnata*.

1. **B. Sinclairii**, Hook. f., n. sp. More or less glandular or glabrate. Rhizome short, simple or branched, as thick as a crow-quill. Leaves all radical, 1–2 in. long, petioled, spathulate, round at the tip, entire lobed or subpinnatifid, coriaceous, nerveless. Scape solitary or several, strict, 2–10 in. high, glandular; bracts 0 or 1 or 2. Head  $\frac{1}{4}$ –1 in. diam., yellow with white ray; involucre scales with or without a purple membranous jagged

border; pappus minute, bristly or 0. Achene much compressed, narrow linear-obovoid, glandular or eglandular, margins thickened.

Var.  $\alpha$ . Leaves obtusely lobulate. Involucral scales with white or pale-purple edges. Achene glandular; pappus 0.

Var.  $\beta$ . Leaves lobulate or entire. Involucral scales as in  $\alpha$ . Achene glabrous; pappus evident.

Var.  $\gamma$ . Smaller, alpine. Leaves quite entire. Scape short, stout, very glandular. Involucral scales with broad purple edges. Achene glabrous; pappus 0. Ray sometimes very long.

**Northern** Island: not common; var.  $\alpha$ , grassy places, east coast, *Colenso*. **Middle** Island: var.  $\alpha$  and  $\beta$ , common in subalpine localities, Gordon's Nob, and top of Macrae's Run, *Munro*; shingle beds, Ahuriri, Mount Misery, alt. 2-4000 ft., and elsewhere in Southern Alps, *Sinclair*, *Travers*, *Hector*, and *Haast*; var.  $\gamma$ , Otago alps, alt. 6-7000 ft., *Hector*. A common and variable plant in the Middle Island; the only representative of the Daisy in New Zealand.

2. **B. odorata**, *Hook. f., n. sp.* A small species, 2-4 in. high, branched from the base, pubescent and subglandular. Rhizome woody, as thick as a crow-quill, perpendicular, with ascending leafy branches at the tip, terminating in stout 1- or 2-bractcate scapes. Leaves few,  $\frac{1}{2}$ -1 in. long; petiole slender; blade spatulate, deeply unequally 3-8-lobed. Scape 2-3 in. long. Head  $\frac{1}{4}$  in. diam.; involucral scales short, not purple at the tips; ray very short; pappus very short, obscure. Achene linear-clavate, densely glandular.

**Northern** Island: Patca village, *Colenso*, who observes that it is a favourite plant with the natives, is called "Ronia," and worn round the neck for its scent. The *B. radicata* of Fl. N. Z. was founded partly on this, and partly on specimens of a *Brachycome* in A. Cunningham's herbarium, which I am now convinced were introduced there by accident, and belong to an Australian species. The name of *B. radicata* had therefore better be abandoned.

3. **B. pinnata**, *Hook. f., n. sp.*—*B. radicata*, var.  $\beta$ , Fl. N. Z. i. 127. Glabrous or minutely pubescent. Rhizome stout, ascending. Leaves all radical,  $\frac{1}{2}$ -1 in. long,  $\frac{1}{6}$  in. broad, narrow linear-oblong, gradually dilated upwards, pinnatifid, the lobes uniform, orbicular, close-set, quite entire, coriaceous, concave beneath. Scape slender, ebractcate, 3 in. long. Head  $\frac{1}{3}$  in. diam.; involucral scales and florets as in *B. Sinclairii*.

**Southern** Island, *Lyall*. I have but one specimen of this pretty little plant.

## 7. BIDENS, Linn.

Erect herbs. Leaves opposite, simple or compound. Heads erect, usually terminal and peduncled.—Involucral scales few, erect, narrow. Receptacle chaffy. Florets of ray ligulate, neuter, or 0; of disk hermaphrodite, tubular, 5-toothed. Styles bifid, arms with subulate points. Pappus of 2-4 barbed hispid rigid awns. Achene narrow, 4-angled, or flattened, sometimes beaked.

A large genus, found in all warm and most temperate parts of the world.

1. **B. pilosa**, *Linn.* An erect, glabrous or slightly hairy annual, 1-2 ft. high, with angular branches. Leaves membranous, lower generally simple, upper pinnately divided, segments 3-5, stalked, ovate or ovate-lanceolate, 1-2 in. long, serrate, rarely lobed. Heads few, terminal on slender pedun-

cles; involucre scales  $\frac{1}{4}$ – $\frac{1}{3}$  in. long; ray fl. few, white or 0. Achenes slender, the inner longer, exceeding the involucre, 4-angled.

**Northern Island**: a weed of cultivation, not indigenous. **Kermadec Island**: on the margin of the crater of Sunday Island, *M'Gillivray*. A common cosmopolitan weed of warm countries.

## 8. ABROTANELLA, Cassini.

*Including CERATELLA, Hook. f., and TRINEURON, Hook. f.*

Small, glabrous, alpine, tufted herbs. Leaves lax or imbricate, long or short.—Heads subsessile, small, inconspicuous, 4–15-flowered; outer fl. female; inner male or hermaphrodite. Involucre cylindric; scales few, erect, in 1 or 2 series, coriaceous. Receptacle narrow; flat, papillose. *Female* fl.: pappus 0 or very small; corolla tubular, unequally 3–5-cleft at the mouth, inflated; style bifid, inserted on a spherical disk; achene 3- or 4-angled, or costate, obovoid or obconic. *Hermaphrodite* fl.: corolla narrow campanulate, 4-cleft; stamens almost free; style truncate.

A small genus, of which the species included under *Ceratella* and *Trineuron* (genera founded by myself on Auckland Island plants) differ much in lax habit and foliage from the original Fuegian *Abrotanella emarginata*, which has closely imbricate, minute leaves; my Tasmanian genus *Scleroleima*, again, has the habit of the Fuegian one. I follow A. Gray (Proceedings Amer. Acad.) in reducing all to *Abrotanella*. The section *Trineuron* is found on the Australian alps and New Zealand; and one species is Fuegian.

Leaves $1\frac{1}{2}$ –1 in., narrow linear-spathulate . . . . .	1. <i>A. spathulata</i> .
Leaves $\frac{1}{4}$ – $\frac{1}{3}$ in., ovate-lanceolate, acute recurved . . . . .	2. <i>A. rosulata</i> .
Leaves $\frac{1}{8}$ – $\frac{1}{3}$ in., very narrow linear, recurved . . . . .	3. <i>A. pusilla</i> .
Leaves $\frac{1}{4}$ in., narrow linear-oblong, straight . . . . .	4. <i>A. inconspicua</i> .

1. **A. spathulata**, *Hook. f.*;—*Trineuron spathulatum*, Fl. Antarct. i. 23. t. 17. Stems short, tufted, 1–2 in. high, leafy. Leaves spreading,  $\frac{1}{2}$ –1 in. long,  $\frac{1}{10}$ – $\frac{1}{12}$  broad, narrow linear-spathulate, acute or obtuse, coriaceous, nerveless. Heads crowded amongst the upper leaves, which are sometimes raised above the others on a short stem,  $\frac{1}{3}$  in. long; involucre scales 8, oblong-lanceolate, with 3 pellucid nerves. *Male* fl.: corolla 4-angled, angles pellucid;—*fem.* fl.: corolla 4-toothed. Achene obovoid, flattened, with 3 cellular ribs.

**Lord Auckland's** group and **Campbell's** Island: in peaty soil, *J. D. H.*

2. **A. rosulata**, *Hook. f.*;—*Ceratella rosulata*, Fl. Antarct. i. 25. t. 18. A small, densely tufted, moss-like herb; stems 1–1 $\frac{1}{2}$  in. high. Leaves imbricating, patent and recurved, rigid, coriaceous,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, narrow ovate or lanceolate, acute, concave above. Heads aggregated amongst the upper leaves,  $\frac{1}{10}$  in. long; involucre scales 8–10, linear-oblong, coriaceous, with pellucid veins. *Male* fl.: corolla 4-angled, angles pellucid;—*fem.* fl.: corolla tubular, 4-toothed. Achene 4-angled, the angles produced into short horns.

**Campbell's** Island: in crevices of rocks, *J. D. H.*

3. **A. pusilla**, *Hook. f.*;—*Trineuron pusillum*, Fl. N. Z. i. 130. Stems slender, 1 in. high, slightly puberulous. Leaves  $\frac{1}{8}$ – $\frac{1}{3}$  in. long, narrow linear,

recurved, sometimes secund. Head solitary, terminal,  $\frac{1}{2}$  in. long; involucre scales linear, obtuse, ribbed. Achene linear-clavate, 4-angled.

**Northern Island:** snowy places amongst the Ruahine mountains, *Colenso*.

4. **A. inconspicua**, *Hook. f. n. sp.* A small, glabrous, tufted, very inconspicuous, moss-like herb. Stems  $\frac{1}{2}$  in. high, densely leafy. Leaves spreading,  $\frac{1}{4}$  in. long,  $\frac{1}{4}$  in. broad, linear, or very narrow linear-oblong, subacute, flat, coriaceous, rather rigid when dry. Head solitary, sunk in the upper leaves; involucre scales linear-oblong, dilated upwards, obtuse, nerved; florets about 16, outer with very slender corollas.

**Middle Island:** forming soft patches on Mount Alta, elev. 6000 ft., *Hector and Buchanan*.

## 9. COTULA, Linn.

*Including LEPTINELLA, Cass., and MYRIOGYNE, Less.*

Herbs, usually perennial, flaccid or succulent, full of minute oil-glands, very aromatic when bruised. Stems creeping or prostrate, terete. Leaves rarely entire, usually pinnatifid. Scapes short or long, ebracteate or bracteate.—Heads small, yellow, subglobular, unisexual, or the outer fl. female, the inner male. Involucre of 1 or more series of few or many scales with scarious margins. Receptacle hemispherical or conical, papillose, the exterior papillæ generally elevated into pedicels for the florets. Florets glandular or eglandular; pappus 0. *Male fl.*: tubular or funnel-shaped, with minute imperfect achenes; 4 or 5 loosely cohering stamens, and stout exserted style with discoid or bifid stigma. *Female fl.*: corolla 0, or short or inflated, contracted at the unequally 3-5-toothed mouth; style exserted, 2-lobed, seated on a spherical disk. Achene compressed, turgid or winged, obtuse or 2-lobed, usually thick and spongy.

A large genus, abounding in many tropical and extratropical countries, especially of the southern hemisphere. I have reduced here *Leptinella* and *Myriogyne* to it. The species are extremely difficult to make out, and better specimens are much wanted.

1. **Cotula**. Heads bisexual, outer florets in few series, female, with flat winged achenes. Corolla 0, or a very minute deformed one.

Stout, glabrous. Leaves  $\frac{1}{2}$ -2 in., variously cut . . . . . 1. *C. coronopifolia*.  
Slender, much branched. Leaves  $\frac{1}{2}$ -1 in. Heads  $\frac{1}{10}$  in. . . . . 2. *C. australis*.

2. **Leptinella**. Heads uni- or bi-sexual, female with inflated corolla. Achenes not winged.

\* *Flower-heads bisexual, outer florets female, in 1 or few series.*

Scapes very leafy. Leaves much cut. Heads blackish . . . . . 3. *C. atrata*.  
Scapes ebracteate.

Stem stout, softly woolly. Leaves 2-pinnatifid, 2-4 in. Florets  
eglandular . . . . . 4. *C. plumosa*.

Stem stout, woolly. Leaves pinnate, 2-3 in. Florets glandular . . . . . 5. *C. lanata*.

Stem slender. Leaves 1-1 $\frac{1}{2}$  in., pinnatifid, lobes short, distant . . . . . 6. *C. minor*.

Stem wiry, slender. Leaves  $\frac{1}{4}$  in., pinnatifid. Heads  $\frac{1}{10}$  in. . . . . 7. *C. filiformis*.

Stem rigid. Leaves 1-1 $\frac{1}{2}$  in., pectinate, lobes few, entire . . . . . 8. *C. pectinata*.

\*\* *Flower-heads unisexual.*

Stout, glabrous or glabrate. Leaves pinnatifid. Scape bracteate.

Heads  $\frac{1}{3}$  in. . . . . 9. *C. pyrethrifolia*.

Slender, silky with white hairs. Leaves pinnatifid. Scape short,  
ebracteate. Heads  $\frac{1}{8}$ - $\frac{1}{3}$  in. . . . . 10. *C. perpusilla*.



Stout, glabrate. Leaves serrate or lobulate. Scape ebracteate.

Heads  $\frac{1}{2}$  in. . . . . 11. *C. dioica*.  
Slender, sub-woolly. Leaves pinnatifid, lobes cut. Heads  $\frac{1}{3}$ – $\frac{1}{2}$  in. . 12. *C. squalida*.

3. **Myriogyne.** Heads bisexual: female florets in very many series; males very few, in the centre. Heads sessile . . . . . 13. *C. minuta*.

1. ***C. coronopifolia*, Linn.**;—*Fl. N. Z.* i. 127. Perfectly glabrous; stems succulent, creeping, branching, ascending, 2–10 in. long. Leaves scattered,  $\frac{1}{2}$ –2 in. long, lanceolate or oblong, variously toothed lobed or pinnatifid; petiole dilated into a broad toothed or lobed sheath. Heads  $\frac{1}{3}$ – $\frac{1}{2}$  in. diam. on the scape-like ends of the branches; involucre scales in 2 or 3 series, linear-oblong, obtuse, membranous: ray fl. 1 series, on slender pedicels; corolla 0; achene flat, broadly winged, wings lobed at top and enclosing the 2-fid style, glandular on the inner face: disk fl. shortly pedicelled; corolla subcylindric, 4-toothed.

**Northern and Middle Islands:** marshy spots in various localities from the Bay of Islands to Otago, *Banks and Solander*, etc. A widely-spread plant, found in Australia, S. America, S. Africa, N. and S. Europe, and N. Africa.

2. ***C. australis*, Hook. f.** *Fl. N. Z.* i. 128. A very slender, much-branched, flaccid herb, glabrous hairy or woolly at the nodes, 2–4 in. high. Leaves  $\frac{1}{2}$ –1 in. long, deeply pinnatifid or 2-pinnatifid; lobes linear, entire. Heads minute,  $\frac{1}{10}$  in. broad, on long slender peduncles; involucre scales in 2 series, membranous, linear-oblong: ray fl. in 3 series, pedicelled, without corolla; achene obovate, broadly winged, wing 2-fid at the top, glandular on the inner face: disk fl. tubular, subcylindric, 4-toothed, teeth glandular.—*Fl. Tasm.* t. 50; *Soliva tenella*, A. Cunn.

**Northern and Middle Islands:** not rare in waste places; also found in Australia, Tasmania, S. Africa, and Tristan d'Aunha.

3. ***C. plumosa*, Hook. f.**—*Leptinella*, *Fl. Antaret.* i. 24. t. 20. A large, tufted, creeping, aromatic, feathery species, more or less covered with soft, matted, villous hairs. Stems creeping, as thick as a goose-quill. Leaves long-petioled, membranous, 2–4 in. long, oblong in outline, pinnate; leaflets close-set, slender, linear, recurved, pinnatifid to the base along the upper side only, ultimate divisions  $\frac{1}{6}$  in. long, linear, toothed on one side. Scapes woolly, shorter than the leaves. Heads  $\frac{1}{3}$  in. diam.; involucre scales 20–30, broad-oblong, woolly, with broad black margins; receptacle conic: ray fl. 2 or 3 series, shortly pedicelled; corolla inflated, much compressed, mouth contracted, unequally 4-toothed, cordate at base; achene obovoid: disk fl. funnel-shaped, 5-toothed.

**Lord Auckland's group, Campbell's Island, J. D. H. M'Quarrie's Islands, Fraser.** Also found in Kerguelen's Land. The largest and most compound-leaved N. Z. species.

4. ***C. lanata*, Hook. f.**—*Leptinella*, *Fl. Antaret.* i. 25. t. 19. A smaller plant than *C. plumosa*; stems creeping, 5–12 in. long, robust, densely woolly or glabrate. Leaves 1–3 in. long, rather thick, with broad petioles, pinnate; pinnules close-set, curved, 3–5-lobed or pinnatifid along the upper edge, minutely glandular. Scapes short, stout, woolly. Heads as in *C. plumosa*, but smaller; involucre scales not purple-edged. Floret of ray narrower, and all florets covered with minute conglobate glands.

**Lord Auckland's** group and **Campbell's** Island, *J. D. H.* The *Leptinella propinqua*, Hook. f., of Campbell's Island, is a broader-leaved variety of this species.

5. **C. atrata**, Hook. f., *n. sp.* Robust, pubescent; stems shortly creeping, ascending or erect, stout, 2–4 in. high, very leafy. Leaves 1 in. long, linear-oblong, erect, pinnatifid; lobes close-set, crenate or toothed, thick and fleshy. Scapes stout, pubescent, clothed with pinnatifid bracts. Heads large,  $\frac{1}{3}$ – $\frac{1}{2}$  in. diam., subglobose; involucre scales in 2 or 3 series, oblong, obtuse, entire or pectinate or pinnatifid; receptacle conic: florets excessively numerous, black when dry; outer female in several series; tube of corolla cylindric, rugose, 3- or 4-toothed; achene linear-oblong, rugose: disk fl. funnel-shaped, with very long rugose tube, 4-toothed.

**Middle** Island: shingle heaps on the alps, alt. 2–6500 ft.; Tarndale, *Sinclair*; Wairau gorge, *Travers*; Ashburton glacier, Mount Torlesse, and Macaulay river, *Haast*. A very singular plant. *Haast* observes that the heads, when fresh, present a dark-yellow eye with a brown rim. The involucre scales are sometimes quite entire, at others all pinnatifid.

6. **C. minor**, Hook. f.—*Leptinella*, Fl. N. Z. i. 129. A small, creeping, pubescent or glabrate species, 1–15 in. long. Leaves either rosulate or alternate on long creeping runners, narrow linear-oblong in outline, pinnatifid almost to the base; leaflets rather distant, short, recurved, obovoid oblong or linear, entire or cut on the upper edge only. Scapes slender, naked. Heads small,  $\frac{1}{4}$  in. diam.; involucre scales 8–20, orbicular, with purple edges: florets yellow, glabrous or glandular, of ray in several series; corolla flattened, ovoid, inflated, with narrow 2- or 3-toothed mouth; achene obcuneate: disk fl. funnel-shaped, with 4 large teeth.

**Northern** and **Middle** Islands: east coast, *Colenso*; Foxhill, Nelson, *Munro*; Canterbury plains, *Lyall*, *Travers*.

7. **C. filiformis**, Hook. f., *n. sp.* A very slender, rigid, creeping plant, glabrous or pilose. Leaves minute,  $\frac{1}{4}$  in. long, oblong, pinnatifid, segments subulate. Scapes filiform, 1 in. long, naked. Heads minute,  $\frac{1}{10}$  in. diam.; involucre scales 6–8, orbicular, with purple edges; receptacle conical; ray-fl. about 20; corolla short, compressed, inflated, very broad oblong, 2-lobed above; achene obconic, glandular; disk fl. funnel-shaped, 4-lobed; lobes glandular.

**Middle** Island: Canterbury plains, amongst grass, *Haast*.

8. **C. pectinata**, Hook. f., *n. sp.* Stems short, tufted, 1–3 in. long, silky-pilose, at length glabrate. Leaves 1–1½ in. long, rigid, narrow linear-oblong, pectinately pinnatifid, the lobes short, subulate, entire, pointing upwards. Scapes slender, naked, 1–1½ in. long. Heads  $\frac{1}{4}$  in. diam.; involucre scales about 15, pubescent, orbicular or oblong, with purple toothed edges; receptacle conic: ray fl. in many series; corolla oblong, compressed, 2-lobed above; achene cuneate, compressed, glandular: fl. of disk funnel-shaped; lobes 4, glandular.

**Middle** Island: Canterbury plains, and crevices of rocks on Mount Torlesse, *Haast*; Otago, grass land in the lake district, *Hector* and *Buchanan*. I have also a specimen without habitat from *Sinclair's* Herbarium. The Mount Torlesse specimens have woolly stems, but the structure of the flower seems the same as the plains ones.

9. **C. pyrethrifolia**, Hook. f., *n. sp.* A small, robust species, glabrous

or sparingly pilose; rhizome branching, tortuous, 1-2 in. long. Leaves  $\frac{1}{2}$ -1 in. long, thick and coriaceous, petiolar part longest; blade pinnatifidly cut into 5-8 alternate linear-oblong or obovate, short, thick, entire lobes,  $\frac{1}{2}$ - $\frac{1}{6}$  in. long. Scapes 1-2 in. long, with one or more linear bracts. Heads unisexual,  $\frac{1}{3}$  in. diam.; involueral scales linear, in several series, herbaceous, with broad, membranous, purple, jagged tips; receptacle hemispheric: florets covered with globose glands;—*fem.*: corolla oblong, ovoid, inflated, with broad truncate base and contracted 4-lobed mouth; achene oblong-cuneate;—*male*: funnel-shaped, 4-lobed.

**Middle** Island: rocks on the Kowai river, and elsewhere in the alps of Canterbury, *Sinclair* and *Haast*; Tarndale plains, alt. 4000 ft., *Travers*; Otago, *Hector* and *Buchanan*. A very distinct species, small but very robust; the leaves have few lobes, and the scapes usually many bracts. It is very odorous when bruised.

10. ***C. perpusilla***, *Hook. f.*—*Leptinella pusilla*, Fl. N. Z. i. 129. A small silky species, with wiry runners 2-5 in. long. Leaves tufted,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long,  $\frac{1}{6}$  in. broad, sessile, narrow linear-oblong in outline, pinnatifid to the base; leaflets close-set, recurved, serrate along the upper edge, silky on both surfaces. Scapes short,  $\frac{1}{4}$  in. long, stout, silky, quite naked. Heads unisexual;—*fem.*:  $\frac{1}{6}$  in. diam.; involueral scales 3 or 4 series, longer than the florets, incurved, orbicular-oblong, silky, coriaceous, with broad membranous toothed purple edges; receptacle conic; florets eglandular; corolla as in *C. pyrethrifolia*, obovoid;—*male* heads much smaller; scales in 1 row; florets fewer, funnel-shaped, glabrous.

**Northern** Island: east coast, *Colenso*. **Middle** Island: grassy places, Kowai river, *Haast*; Tarndale plains, 4000 ft., *Travers*.

11. ***C. dioica***, *Hook. f.*—*Leptinella dioica*, Fl. N. Z. i. 129. Glabrous or slightly hairy. Stems creeping, rather robust, short, 1-3 in. long. Leaves petioled, 1-2 in. long,  $\frac{1}{4}$ - $\frac{1}{3}$  broad, linear obovate or spatulate, obtuse, crenate-serrate lobulate or semipinnatifid; lobes entire or serrate on the upper edge, glabrous. Scapes longer or shorter than the leaves, without bracts. Heads  $\frac{1}{6}$ - $\frac{1}{3}$  in., male and female similar; involueral scales 2 or 3 series, oblong-orbicular, hairy, with broad, purple, toothed margins; receptacle conical; florets as in *C. perpusilla*, but eglandular.—*Soliva tenella*, A. Cunn.

**Northern** Island: Cape Turnagain, east coast, *Colenso*. **Middle** Island: Canterbury plains and Acheron valley, alt. 4000 ft., *Travers*; Akaroa, *Raoul*; grassy terraces, Kowai river, *Haast*; Otago, sands and swamps near the sea, and in the interior, *Lindsay*, *Hector* and *Buchanan*. Very near and perhaps not different from the Chilean and Fuegian *Leptinella scariosa*, Cass. (*Soliva dioica*, Schultz, *L. ancistroides*, H. and A.), but that has deeply pinnatifid leaves and rather glandular flowers. The scarcely pinnatifid leaves of this species are its most prominent characters.

12. ***C. squalida***, *Hook. f.*—*Leptinella*, Fl. N. Z. i. 129. A slender species, with long, weak, creeping, woolly stems, and long soft hairs on the leaves and scapes. Leaves 1-2 in. long,  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, long linear-obovate, flaccid, petioled, pinnatifid; leaflets rather lax, recurved, incised along the upper margin. Scapes slender, ebracteate, tomentose, longer than the leaves. Heads unisexual;—*fem.*:  $\frac{1}{3}$  in. diam.; involueral scales numerous, in many series, longer than the florets, incurved, orbicular, with erose purple margins, silky; receptacle conical; florets as in *C. perpusilla*, eglandular;—*male* heads much smaller,  $\frac{1}{6}$  in. diam.; involueral scales very few, and florets few.

**Northern Island:** Hawke's Bay, etc., east coast, *Colenso*. **Middle Island:** Akaroa, *Raoul*; Canterbury, *Travers*. Also very nearly allied to the South American *Leptinella scariosa*, but the large female heads, with large incurved involucre scales concealing the florets, as in *L. perpusilla*, are very different.

13. **C. minuta**, *Forst.*—*Myriogyne minuta*, Less.—Fl. N. Z. i. 130. A glabrous, prostrate, excessively branched, annual herb. Leaves alternate, sessile on the branches,  $\frac{1}{4}$ – $\frac{2}{3}$  in. long, lanceolate or oblong-lanceolate, unequally sparingly toothed. Heads  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam., axillary, sessile, depressed, spherical; involucre scales in 2 series, linear, obtuse;—*fem.* fl. very numerous, densely packed; corolla short, 4-cleft; achene linear, angled, pilose;—*male* fl. very few, central; corolla broadly campanulate.

**Northern and Middle Islands**, in waste places near settlements, *Forster*, etc. Very fragrant when bruised. Also a native of India, China, Japan, Australia, the Pacific islands, and Chili (*M. elatinoides*, Less.).

## 10. CRASPEDIA, Forster.

Perennial, erect, silky, simple, leafy herbs, bearing one globose, terminal, dense, involucre, compound head, formed of numerous slender flower-heads, aggregated on a small receptacle. Leaves radical and alternate, simple, long.—Heads narrow, of 5–8 small, yellow, tubular, 5-toothed florets. Involucre scales long, membranous, hyaline, linear. Receptacle very narrow, bearing hyaline scales amongst the florets. Pappus of 1 row of very soft feathery hairs. Anthers with 2 slender tails. Styles included. Achene silky, oblong, narrow.

A small genus of Tasmanian, Australian, and New Zealand plants, excessively variable.

Pubescent or tomentose . . . . . 1. *C. fimbriata*.  
Lanate with white wool . . . . . 2. *C. alpina*.

1. **C. fimbriata**, *DC.*—Fl. N. Z. i. 131. Slender or robust, 4–15 in. high. Leaves usually all radical, with only bracts on the scape; radical petiolate, 1–8 in. long, spatulate, obtuse, quite entire, usually fringed with white tomentum, glabrate pubescent or woolly. Compound head  $\frac{1}{4}$ –2 in. diam., soft, white dotted with yellow florets.—*C. uniflora*, Forst.

**Northern and Middle Islands:** abundant, from the East Cape southwards, *Banks* and *Solander*, etc., ascending to 5500 ft. on the Discovery Peaks. I cannot distinguish this satisfactorily from the Australian and Tasmanian *C. Richea*.

2. **C. alpina**, *Backhouse*, in *Fl. Tasm.* i. 198.—*C. fimbriata*, *æ. lanata*, Fl. N. Z. i. 132. Very near *C. fimbriata*, and perhaps only a variety, but at once distinguished by the clear white cottony wool on the lower or on both surfaces of the leaf and scape.

**Middle Island:** Nelson mountains, *Bidwill*; Upper Waihopai and Wairau, *Munro*; grassy places on the Rangititi, Kowai and Godley rivers, alt. 4–6000 ft., *Haast*; Otago, lake district, *Hector* and *Buchanan*. Intermediates between this and the preceding may be found. It is a native of the Tasmanian and Victorian alps.

## 11. CASSINIA, Br.

Shrubs. Leaves alternate, small, persistent, simple, often white or rusty below. Heads in terminal panicles or corymbs, small, white.—Involucre



cylindric turbinate or campanulate, of many or few, short, obtuse, imbricating scales, the innermost with short, white, dilated rays. Receptacle contracted, covered with slender scales like the inner involucre, except *C. fulvida*. Florets tubular, all similar and hermaphrodite, or the outer very slender and female. Corolla 4- or 5-toothed. Anthers 2-tailed. Arms of the style long, truncate, glandular. Pappus of 1-4 series of soft slender hairs, rather thickened at the tip. Achene small, oblong or obovate.

A small Australian, New Zealand, and New Caledonian genus, distinguished from *Ozothamnus* by the linear scales amongst the florets. I fear that the first three species may prove forms of one. *C. pinifolia* is a native of New Caledonia, not of New Zealand.

Leaves oblong or obovate, whitish below. Heads few . . . . . 1. *C. retorta*.  
 Leaves linear, narrow, whitish below, not glutinous. Heads numerous 2. *C. leptophylla*.  
 Leaves linear, narrow, fulvous below, glutinous. Heads numerous . 3. *C. fulvida*.  
 Leaves obovate or oblong, fulvous below, glutinous. Heads numerous 4. *C. Vauvilliersii*.

1. **C. retorta**, *A. Cunn.*;—*Fl. N. Z.* i. 132. A shrub, 10-15 ft. high. Branches and leaves below covered with white tomentum, not glutinous. Leaves close-set,  $\frac{1}{8}$  in. long, spreading or recurved, linear-obovate or linear-oblong, obtuse, with recurved margins, opaque above. Heads 1-8 together, 6-8-flowered, turbinate, shortly pedicelled,  $\frac{1}{4}$  in. long; involucre scales with white tomentum.

**Northern** Island: not rare, especially near the coasts.

2. **C. leptophylla**, *Br.*;—*Fl. N. Z.* i. 133. A shrub like *C. retorta* in habit and pubescence, also glutinous, but more slender. Leaves erect or spreading, rarely recurved,  $\frac{1}{12}$ — $\frac{1}{10}$  in. long,  $\frac{1}{20}$  broad, narrow linear, with recurved margins, glabrous above and more or less shining. Heads numerous, in terminal hemispherical corymbs,  $\frac{1}{8}$ — $\frac{1}{4}$  in. long, 8-10-flowered, narrow turbinate or tubular; involucre scales few, scarious, glabrate, shining.—*Calea leptophylla*, Forst.

**Northern** and **Middle** Islands, *Banks* and *Solander*; Cape Palliser and east coast, *Colenso*; East Cape, *Sinclair*. **Middle** Island: Port Underwood, *Lyall*.

3. **C. fulvida**, *Hook. f.*—*C. leptophylla*,  $\gamma$ , *Fl. N. Z.* i. 133. A shrub with the habit, etc., of *C. leptophylla*, but glutinous, with foliage larger and tomentum fulvous. Branches covered with subviscid tomentum. Leaves  $\frac{1}{8}$ — $\frac{1}{4}$  in. long, spreading, linear, obtuse, margins recurved, fulvous below, more or less shining and glutinous above. Heads very numerous, in terminal corymbs,  $\frac{1}{8}$ — $\frac{1}{4}$  in. long, 4- or 5-flowered; involucre scales pubescent or glabrate; scales amongst the florets few or 0.

**Northern** Island: Cape Palliser, *Colenso*. **Middle** Island, *Lyall*; mountains of Nelson, *Munro*; Look-out Point, Dunedin, *Lindsay*; river-beds in the Kowai, alt. 2-4000 ft., *Haast*; Otago, common, *Hector* and *Buchanan*. I am still in some doubt as to the validity of this species, of which I had but one scrap when the *Fl. N. Z.* was prepared; the various specimens received since all agree with the original, and differ from *C. leptophylla* (to which, however, it is very nearly allied), by the strong fulvous colour and glutinous foliage. I find few or no scales amongst the florets, so, by right, the plant should perhaps be referred to *Ozothamnus*.

4. **C. Vauvilliersii**, *Hook. f.* *Fl. N. Z.* i. 133. An erect, dense, fastigiate-branched shrub, 2-10 ft. high. Branches and leaves below covered with fulvous tomentum. Leaves erect or patent,  $\frac{1}{4}$ — $\frac{1}{3}$  in. long, linear-

oblong or obovate, obtuse, margins recurved, costate below, opaque or shining and generally glutinous above. Heads numerous, in terminal globose corymbs,  $\frac{1}{5}$  in. long, turbinate, on tomentose, very short pedicels; involucre scales few, scarious, woolly; scales amongst the florets numerous.—*Ozothamnus Vauvilliersii*, Homb. and Jacq. Voy. au Pôl. Sud, Bot. t. 5.

**Northern** and **Middle** Islands: common on the mountains, *Bidwill*, etc. Scarcely distinguishable from a true *Ozothamnus* of Tasmania (*O. cuneifolius*, A. C.).

## 12. OZOTHAMNUS, Br.

Characters of *Cassinia*, but without any scales amongst the florets; inner scales of the involucre without white radiating tips in the New Zealand species, and hairs of pappus not always thickened at the tip.

A large Australian and Tasmanian genus, very variable in habit.

Heads corymbose. Slender shrub. Leaves orbicular, petiolate, lax . . . 1. *O. glomeratus*.  
Heads solitary, terminal, sessile.

Leaves sub-4-farious, keeled and polished at back . . . . . 2. *O. microphyllus*.

Leaves sub-6-farious, linear, hoary or silky . . . . . 3. *O. depressus*.

Leaves imbricated in very many series, polished and convex on back . . . 4. *O. coralloides*.

Leaves imbricated in 6-8 series, polished and keeled on back . . . 5. *O. Selago*.

1. ***O. glomeratus***, Hook. f. *Fl. N. Z.* i. 133. A spreading bush; branches slender, flexuous, tomentose at the tips. Leaves scattered,  $\frac{1}{4}$ –1 in. broad, orbicular or broadly ovate or spathulate, quite entire, often apiculate, margins recurved, white and cottony beneath, suddenly contracted into slender petioles. Heads in small, lateral, subglobose, sessile or peduncled corymbs, small,  $\frac{1}{10}$  in. long, pedicelled or sessile; involucre scales scarious, woolly at the base, a few outer florets slender, female. Pappus-hairs thickened at the tip. Achene puberulous.—*Swammerdamia glomerata*, Raoul, Choix, 20. t. 16.

**Northern** and **Middle** Islands: dry hills from the Bay of Islands to Otago, *Banks* and *Solander*, etc.

2. ***O. microphyllus***, Hook. f. *Fl. N. Z.* i. 134. t. 35 A. A depressed woody shrub. Branches tomentose, ascending, crowded, densely covered with imbricating leaves,  $\frac{1}{12}$  in. diam. Leaves minute,  $\frac{1}{16}$ – $\frac{1}{12}$  in. long, closely imbricating, almost quadrifariouly, appressed to the stem, triangular, ovate, thick, obtuse, obtusely keeled, woolly next the stem, green and polished at the back, with sometimes an oblong spot below the tip. Heads solitary, terminal, sessile, turbinate,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long; involucre scales scarious, glabrous or pubescent, inner somewhat dilated at the tip. Pappus not thickened at the tip. Achene pubescent.

**Middle** Island: Wairau Pass, 4000 ft., *Bidwill*, *Sinclair*; Southern Alps, clefts of perpendicular rocks, *Sinclair* and *Haast*. The Nelson specimens have more slender branches than the more southern.

3. ***O. depressus***, Hook. f. *Fl. N. Z.* i. 134. A prostrate, silver-grey, woody shrub, sometimes 5 ft. high, with straggling, divaricating, rigid, slender branchlets, hoary or with appressed cottony down. Leaves minute,  $\frac{1}{12}$  in. long, closely appressed to the branchlets and imbricating towards their tips, linear, obtuse, silky, woolly above. Heads  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, solitary, sessile on the tips of the branchlets; involucre scales very narrow, acuminate, recurved, cottony at the base. Pappus very slender. Achene glabrous.

**Middle Island:** Nelson mountains, banks of streams, Clarence and Wairau valleys, alt. 3-5000 ft., *Bidwill, Sinclair, Travers*, Great Tasman glacier and elsewhere, on shingle beds in the Southern Alps, *Haast*, and Otago mountains, *Hector and Buchanan*.

4. **O. coralloides**, *Hook. f. Fl. N. Z. ii. 332*. A very remarkable, woody, short, stout, branched shrub. Branches (with the leaves on) cylindric, as thick as the finger, the leaves resembling tubercles on their surface. Leaves in very numerous series, closely and densely imbricating, oblong, obtuse,  $\frac{1}{6}$ - $\frac{1}{4}$  in. long, upper part very thick, convex and shining, lower part membranous; surface next to the stem densely clothed with white cotton. Head small, solitary, hidden amongst the uppermost leaves at the tip of the branch; involucre scales linear, recurved, with membranous tips.

**Middle Island:** Kaikora mountains, *M'Donald*; Upper Awatere valley, *Sinclair*.

5. **O. Selago**, *Hook. f. Fl. N. Z. i. 332*. A good deal similar to *O. coralloides*, also very stout and woody, but intermediate between it and *O. microphyllus*. Branchlets with leaves on  $\frac{1}{8}$  in. diam. Leaves imbricating in 5 or 6 series, oblong-ovate, obtuse, or subacute, trigonous, the exposed part of back keeled, shining, surface next the stem densely cottony. Heads terminal, solitary, sessile, exposed; involucre scales linear-oblong, obtuse, lower half coriaceous, upper scarious.

**Middle Island:** Kaikora mountains, *M'Donald, Sinclair*.

### 13. **RAOULIA**, *Hook. f.*

Very small, generally tufted (often most densely), alpine and subalpine, slender, or rigid and stout herbs. Leaves minute, usually silky woolly or cottony, often most densely imbricated. Heads small, terminal, sessile.—Involucre oblong; scales scarious, in 2 or 3 series, the inner often white and radiating. Receptacle very narrow, papillose or fimbriate. Florets of circumference in 1 or 2 series, female; corolla filiform, 3- or 4-toothed; arm of style exerted. Florets of disk numerous, hermaphrodite; corolla funnel-shaped above; anthers with slender tails; arms of style shorter. Pappus of 1 row of slender or stout scabrid hairs, sometimes thickened at the tips. Achene small, oblong.

A genus founded on habit more than on any good characters that can separate it from *Gnaphalium*, section *Helichrysum*; its herbaceous habit distinguishes it from *Ozothamnus*. It contains two natural and most distinct sections, of which one, containing *R. subulata*, *eximia*, *grandiflora*, *mammillaris*, and *bryoides* has a convex, often hispid receptacle; achenes with very long, silky hairs, a thickened areole at their base; and stout, rigid, opaque pappus hairs, thickened at the tip; these probably constitute a good genus, to which the name *Raoulia* may be retained: the others may perhaps fall into *Gnaphalium* or *Helichrysum*, but until all the Gnaphalioid *Compositæ* are worked up, it is impossible to settle the limits of the genera. I at one time suspected that the white radiating involucre indicated sexual differences, but I have failed to prove this. The style has often 3 arms in this genus. *Helichrysum Youngii*, has much the habit of a *Raoulia*, but more that of the genus I have placed it in.

1. *Involucral scales without white or radiating tips. Pappus-hairs numerous, slender, not thickened at the tip.*

Leaves  $\frac{1}{12}$  in., erect or recurved, spatulate, obtuse . . . . . 1. *R. australis*.  
 Leaves  $\frac{1}{12}$  in., recurved, narrow oblong or spatulate, acute or mucronate . . . . . 2. *R. tenuicaulis*.  
 L 2

Leaves  $\frac{1}{4}$  in., erecto-patent, broadly ovate, glabrate . . . . . 3. *R. Haastii*.  
 Leaves  $\frac{1}{8}$  in., patent, recurved, linear, obtuse, silky . . . . . 4. *R. Munroi*.

2. *Involucre as 1. Pappus-hairs few, rigid, thickened at the tip. Achenes with long hairs and a thickened areole at the base.*

Leaves glabrous, subulate, rigid . . . . . 5. *R. subulata*.  
 Leaves most densely imbricate, hidden in silky wool . . . . . 6. *R. eximia*.  
 Leaves ovate, obtuse, silvery, grooved when dry . . . . . 7. *R. Hectori*.

3. *Involucre with the inner scales white-tipped, and radiating. Pappus as in 1.*

Stems long. Leaves loosely imbricate, linear-oblong, glabrate . . . . . 8. *R. glabra*.  
 Stems short. Leaves densely imbricate, linear-oblong, glabrate or silky . . . . . 9. *R. subsericea*.

4. *Involucre as in 3. Achenes and pappus as in 2.*

Leaves closely imbricate, ovate-subulate, silvery . . . . . 10. *R. grandiflora*.  
 Leaves most densely imbricate, with a velvety silky tuft above middle . . . . . 11. *R. mammillaris*.  
 Leaves most densely imbricate, tips covered with appressed wool . . . . . 12. *R. bryoides*.

1. ***R. australis***, *Hook. f. Fl. N. Z. i. 135*. A small, moss-like, densely-tufted plant; stems 1–2 in. high; branches slender, erect or prostrate. Leaves minute, laxly or densely imbricate,  $\frac{1}{6}$ – $\frac{1}{2}$  in. long, spatulate, erect or recurved, rounded at the tip, covered with silky appressed wool. Heads  $\frac{1}{2}$ – $\frac{1}{8}$  in. long; outermost scales spatulate, inner linear, scarious, shining, yellow or pale brown, not dark at tips, nor white and radiating; florets about 12, outer few. Pappus hairs excessively slender, subpilose, not thickened at the tips. Achene glabrous or puberulous.—*Raoul, Choix, t. 15*.

**Northern** Island: Tongariro and Waikato, *Bidwill*; and elsewhere, in lofty, rocky hills, *Colenso*. **Middle** Island: Nelson mountains, *Bidwill*; rocky hills at Akaroa, *Raoul*, *Lyall*; Clarence, Tarndale plain, and Wairau valleys, alt. 3500 ft., *Travers*; Southern Alps, *Haast*; Otago, *Hector and Buchanan*. A very variable plant.

2. ***R. tenuicaulis***, *Hook. f. Fl. N. Z. i. 135. t. 36 A*. Stems generally slender, loosely tufted, prostrate, creeping, 1–10 in. long, with ascending branches. Leaves loosely imbricating, spreading and recurved,  $\frac{1}{2}$  in. long, linear-oblong or spatulate-lanceolate, apiculate or acuminate, rarely broadly spatulate, grey with appressed silvery tomentum, rarely glabrate. Heads as in *R. australis*, but involucreal scales with brown acute tips.

**Northern** Island: gravelly beds of rivers, Wairarapa, Ruanahanga, Palliser Bay, etc., *Colenso*. **Middle** Island: Kowai river, alt. 1–2000 ft., *Haast*.

3. ***R. Haastii***, *Hook. f., n. sp.* A small, densely tufted, nearly glabrous species; stems rather stout, prostrate; branches 1 in. high. Leaves densely imbricate, erecto-patent,  $\frac{1}{6}$  in. long, broadly sheathing, broadly ovate-subulate, obtuse, coriaceous, obscurely woolly or silky. Heads as in *R. australis*, but narrower, with 6–8 florets; involucreal scales obtuse, not brown nor with a white radiating tip.

**Middle** Island: gravelly terraces, Kowai river, *Haast*; Waiauna valley, alt. 3000 ft., *Sinclair, Travers*. I was at first disposed to regard this as a form of *R. tenuicaulis*, but the leaves are very different in shape and in their broad bases, and the involucreal scales are not brown at the tips.

4. ***R. Munroi***, *Hook. f., n. sp.* Stems slender, creeping, with very long, wiry, filiform rootlets. Branches slender, ascending, 1–2 in. high. Leaves laxly imbricate, patent and recurved,  $\frac{1}{8}$ – $\frac{1}{6}$  in. long, linear, obtuse, uniformly clothed with grey silky tomentum. Heads narrow,  $\frac{1}{6}$  in. long; involucreal



scales glabrous, linear, green, with rather dilated scarious brown tips; florets about 12; pappus as in *R. australis*.

**Middle Island:** Waihopai valley, *Munro*; Canterbury plains, *Travers*. The wiry stems and very long filiform rootlets, are prominent characters, as are the uniformly grey, silky, linear leaves, and narrow heads with brown-tipped involucre scales.

5. ***R. subulata*, Hook. f., n. sp.** A small, very densely tufted, rigid, moss-like species, quite glabrous throughout, blackish when dry. Stems stoutish, branches  $\frac{1}{2}$  in. high. Leaves most densely imbricate, patent or suberect, rigid, subulate, acuminate. Heads large for the size of the plant,  $\frac{1}{6}$  in. diam.; involucre scales linear-oblong, scarious, shorter than the leaves; receptacle convex, hispid; florets of circumference in several rows. Pappus of rigid, scabrid hairs, rather thickened at the tips. Achene silky.

**Middle Island:** Nelson mountains, *Sinclair*; Otago mountains, alt. 5-6000 ft., *Hector and Buchanan*. A remarkable and very small species, differing much from the foregoing in the pappus, hispid receptacle, and foliage.

6. ***R. eximia*, Hook. f., n. sp.** A small, most densely tufted, hard little plant, forming large woolly balls on the mountains, enveloped in soft, velvety, white tomentum. Branches very short, with the leaves forming cylindric or mammilliform knobs,  $\frac{1}{4}$  in. diam. Leaves most densely compacted, wholly hidden amongst woolly hairs, imbricated all round in many series,  $\frac{1}{8}$  in. long, membranous, broadly linear- or obovate-oblong, rounded at the tip, bearing at the back above the middle a dense thick pencil of white velvety hairs, these bundles of hairs, meeting beyond the leaves, envelope the whole. Heads minute, sunk amongst the upper leaves; involucre scales about 10, linear, with subulate or obtuse tips, and a tuft of hairs on the back above the middle; receptacle convex, naked; florets about 10. Pappus of few rigid hairs, thickened upwards. Achene silky, with very long hairs.

**Middle Islands:** Ribband-wood rage, Mount Arrowsmith and Dobson, alt. 5500-6000 ft., *Sinclair, Haast*. A most singular plant, forming hemispherical cushions on the mountains, 2 ft. high and 3 in. diam., called "Vegetable Sheep." Very near allied to *R. mammillaris*.

7. ***R. Hectori*, Hook. f., n. sp.** Most densely tufted, 1-2 in. high; branchlets erect, densely leafy, silvery at the tips. Leaves closely imbricate, erecto-patent,  $\frac{1}{1\frac{1}{2}}$  in. long, broadly ovate, obtuse, coriaceous, more membranous below the middle, upper half covered with appressed silvery shining tomentum, back grooved longitudinally when dry. Heads small, sunk amongst the uppermost leaves; involucre scales about 10-12, scarious, linear-oblong, obtuse or subacute, yellowish, glabrous; receptacle conical, pilose; florets about 20. Pappus of few, rigid, scabrous hairs, thickened upwards. Achene silky.

**Middle Island:** Otago, lake district, in dry, subalpine places, *Hector and Buchanan*. A very distinct species, resembling in habit some states of *R. australis*.

8. ***R. glabra*, Hook. f. Fl. N. Z. i. 135.** Stems elongate, slender, prostrate, branching, 2-10 in. long; branches ascending. Leaves laxly imbricate, spreading, hardly ever recurved,  $\frac{1}{2}$  in. long, linear or linear-oblong, acute or obtuse, glabrous or nearly so, rarely silky, 1-nerved, green. Heads rather large,  $\frac{1}{4}$ - $\frac{1}{3}$  in. diam.; outer involucre scales leaf-like, but with broader bases; inner linear, with short, white, radiating tips; florets numerous, outer in 2 series,

Pappus of numerous soft, white, slender hairs as in *R. australis*. Achene puberulous.

**Middle Island:** Nelson mountains, *Bidwill*; Milford Sound, *Lyll*; shingle beds, Rangitata river, and Mount Cook, alt. 1800-3200 ft., *Sinclair*, *Haast*; Otago mountains, alt. 3-4000 ft., *Hector and Buchanan*. *Haast* sends apparently a silky variety, with rather broader leaves, from mountains near Lake Hawea, alt. 4000-5000 ft.

9. ***R. subsericea*, Hook. f. Fl. N. Z. i. 136.** Very similar in most characters to *R. glabra*, and perhaps an alpine variety of that, but a much more densely tufted plant, with very short stems and branches, closely imbricated, linear-oblong leaves, glabrous or covered loosely with silvery tomentum, green or silvery-white. Heads similar, but larger,  $\frac{1}{3}$  in. diam.

**Middle Island:** Wairau mountains, Clarence valley, Aglionby plains, alt. 3000-4000 ft., and elsewhere in Nelson, *Munro*, *Sinclair*, *Travers*; Port Cooper, *Lyll*; Godley rivulet and Mount Darwin, alt. 3-5000 ft., *Haast*; Otago mountains, alt. 4000 ft., *Hector and Buchanan*.

10. ***R. grandiflora*, Hook. f. Fl. N. Z. i. 136.** A very short, erect, densely tufted species, with very long, wiry, thread-like roots. Stems 1 in. high, densely leafy, with the leaves on as thick as the little finger. Leaves imbricating all round the stem,  $\frac{1}{6}$ - $\frac{1}{4}$  in. long, erecto-patent, ovate-subulate, rigid, shining with white silky hairs, cottony at the base, striate. Heads large,  $\frac{1}{3}$ - $\frac{1}{2}$  in. diam.; involucre scales 1 or 2 series, long, white, linear, spreading,  $\frac{1}{4}$  in. long; receptacle convex, hispid. Pappus hairs few, rigid, swollen towards the tip. Achene silky.

**Northern Island:** summits of the Ruahine range, *Colenso*. **Middle Island:** top of Gordon's Nob, *Munro*; Upper Wairau, *Sinclair*; top of Big Ben, Mounts Cook, Darwin and Torlesse, alt. 5-7000 ft., *Haast*; Mount Brewster, alt. 5-6000 ft., forming carpets, *Hector and Buchanan*. Allied in many respects to *R. subulata*, and especially in the hispid receptacle.

11. ***R. mammillaris*, Hook. f., n. sp.** Like *R. eximia*, forming large, hard, hemispherical balls and patches on the ground, sometimes 8 ft. long and 3 high. Branches very short, thick, with the leaves on forming cylindric or mammillary knobs,  $\frac{1}{4}$  in. diam. Leaves most densely compacted, imbricated in many series, spreading,  $\frac{1}{10}$ - $\frac{1}{12}$  in. long, obovate cuneate or spathulate, obtuse, membranous, cottony below, with a dense brush of velvety hairs on both surfaces beyond the middle, which does not exceed the tip of the leaf. Heads very small,  $\frac{1}{6}$  in. diam., about 10-flowered; inner involucre scales with short, white, acute, radiating tips; receptacle convex, naked. Pappus of few rigid hairs thickened at the tips. Achene with a swollen areole at the base and long white silky hairs.

**Middle Island:** Mount Torlesse, on hard soil and rocky places, alt. 3-5000 ft., *Haast*. Very similar in many respects to *R. eximia*, and closely allied to it, but the leaves are smaller, with the velvety hairs not so long as to hide them, more cottony and obovate, and the inner involucre scales are distinctly rayed.

12. ***R. bryoides*, Hook. f. Fl. N. Z. ii. 322.** Forming hard, dense, convex, hoary patches, with an even surface. Branches  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long, densely compacted, with the leaves on cylindric,  $\frac{1}{10}$ - $\frac{1}{6}$  in. diam. Leaves most densely imbricate all round the branches, erecto-patent,  $\frac{1}{12}$ - $\frac{1}{10}$  in. long, broad, linear,

rather dilated at the obtuse tip, membranous, coriaceous; margins cottony, glabrous below the upper  $\frac{1}{3}$ , above that covered with appressed silky wool, 1-nerved. Heads  $\frac{1}{4}$  in. diam., about 12-flowered; involucre scales with white, subacute, radiating tips; receptacle tumid. Pappus-hairs few, rigid, with thickened tips. Achene with very long white hairs and a thickened areole at the base.

**Middle Island:** top of Gordon's Nob, *Munro*; Clarence and Wairau valleys, alt. 3000-4000 ft., *Sinclair, Travers*.

#### 14. GNAPHALIUM, Linn.

Herbs of very various habit, annual or perennial, the New Zealand species all more or less densely covered on the leaves below, or all over, with white cottony wool. Heads solitary or corymbose or fascicled.—Involucre campanulate hemispherical or turbinate; scales narrow, in several series, all similar, scarious and shining, or the inner produced into white spreading rays. Receptacle flat or conic, papillose or alveolate. Florets of ray female, in 1 or more series, very slender, tubular, 3-5-toothed; of disk hermaphrodite, funnel-shaped above. Anthers with slender tails. Pappus hairs in one series, slender or stout and thickened at the tip, slightly cohering at the base. Achene small, linear-oblong, usually pubescent.

I have in vain sought to arrange the New Zealand *Gnaphalia* and *Helichrysa* under these genera as defined by De Candolle and other authors, any separation of them into these involves bringing together plants most different, and separating most closely allied ones. Thus, those with white radiating involucre scales form, I think, a most natural genus or group; but I cannot identify them as a group either with *Helichrysum*, *Antennaria*, or *Anaphalis*, of authors, to many species of which they seem naturally allied. The bracteate species again so closely resemble the European and Himalayan *Leontopodia*, that they seem naturally congeneric, but they differ in several very important floral characters. I have not neglected to examine Weddell's character of the pappus hairs cohering or free at the base, but cannot apply it to the New Zealand species, in all of which the hairs very partially cohere, but are so readily separated that the character is valueless. The thickness of the pappus hairs, and their thickening upwards, constitutes an excellent character, and generally goes with that of the outer florets being in one series; these together should perhaps distinguish the New Zealand *Helichrysa* or *Antennariæ* from *Gnaphalium*, and I have indicated them accordingly under the former name.

1. *Heads solitary, inner involucre scales white, radiating. Florets of circumference in several series. Pappus hairs very slender.*

- |  |                             |
|--|-----------------------------|
| Stem 8-18 in. Leaves $\frac{1}{4}$ in., apiculate. Head sessile . . . . .          | 1. <i>G. prostratum</i> .   |
| Stem 2-10 in. Leaves $\frac{1}{4}$ in., apiculate. Head on long peduncle . . . . . | 2. <i>G. bellidioides</i> . |
| Stem very short, densely tufted. Leaves obtuse. Head sessile . . . . .             | 3. <i>G. Youngii</i> .      |

2. *Heads corymbose, not bracteate. Inner involucre scales white, radiating. Florets of circumference in many series (except in 7). Pappus hairs very slender (except 7).*

- |   |                           |
|---|---------------------------|
| Stem robust. Leaves $2 \times \frac{1}{4} - \frac{1}{3}$ in. Corymbs dense. Heads $\frac{1}{2}$ in. diam. . . . . | 4. <i>G. Lyallii</i> .    |
| Stems slender. Leaves $\frac{1}{2} - 1$ in. Heads few, $\frac{2}{3}$ in. diam. . . . .                            | 5. <i>G. trinerve</i> .   |
| Stem slender. Leaves $\frac{1}{2} - 2$ in. Heads $\frac{1}{3}$ in. diam. . . . .                                  | 6. <i>G. Keriense</i> .   |
| Stem 2-4 in. Leaves tomentose on both sides. Heads numerous, $\frac{1}{4}$ in. diam. . . . .                      | 7. <i>G. Sinclairii</i> . |

3. *Heads solitary. Inner involucre scales not white and radiating.*

- |  |                          |
|--|--------------------------|
| Stem filiform, erect. Leaves scattered, cottony below . . . . .        | 8. <i>G. filicaule</i> . |
| Leaves radical, densely cottony on both sides. Scape cottouy . . . . . | 9. <i>G. Traversii</i> . |



Stems short, tufted. Leaves silky on both surfaces . . . . . 10. *G. nitidulum*.

4. *Heads corymbose, not bracteate. Inner involucrel scales not white nor radiating. Pappus hairs very slender* . . . . . 11. *G. luteo-album*.

5. *Heads collected into a dense, bracteate globe. Inner involucrel scales not white nor radiating. Bracts broad, densely woolly. Female florets in 1 series. Pappus-hairs stout, rigid, thickened upwards.*

Leaves  $\frac{3}{8}$ – $\frac{1}{2}$  in. long, rosulate. Inflorescence on a stout, terminal peduncle . . . . . 12. *G. Colensoi*.

Leaves  $\frac{1}{4}$  in. long, densely imbricate, recurved. Inflorescence sessile 13. *G. grandiceps*.

6. *Heads collected into a dense, bracteate globe. Bracts linear. Inner involucrel scales not white nor radiating. Female florets in many series. Pappus hairs very slender.*

Stem erect, branched, leafy. Leaves linear, glabrous above . . . . . 14. *G. involucrelratum*.

Leaves radical, spreading, and scape densely cottony . . . . . 15. *G. collinum*.

1. **G. prostratum**, *Hook. f. Fl. Antarct.* 30, t. 21;—*Fl. N. Z.* i. 137. Stems rather slender, prostrate, woody at the base, 8–18 in. long, with many ascending leafy branches. Leaves uniform, loosely imbricating,  $\frac{1}{4}$  in. long, spreading or recurved, flat, obovate-spathulate, covered below or on both surfaces with dense, white, appressed wool, 1-nerved. Heads sessile at the tips of the branches,  $\frac{1}{3}$  in. diam.; involucrel scales in many series, white, radiating;  $\frac{1}{4}$  in. long, with white cottony claws; receptacle conical; female florets in many series; pappus hairs very slender. Achene glabrous.

**Northern** Island: Mount Egmont, alt. 4000 ft., *Dieffenbach*; top of Titiokura, *Colenso*. Abundant in **Lord Auckland's** group and **Campbell's** Island, *J. D. H.*

2. **G. bellidioides**, *Hook. f. Fl. N. Z.* i. 137. Stems and leaves and flower-heads as in *G. prostratum*, of which it is probably a variety, but the ends of the branches are produced into slender bracteate peduncles, 2–5 in. long. Receptacle conical, or plane with a conical mammilla.—*Xeranthemum*, *Forst.*

Abundant in alpine districts in the **Northern** and **Middle** Islands, ascending to 5000 ft., *Banks and Solander*, etc.

3. **G. (Helichrysum) Youngii**, *Hook. f., n. sp.* A small, prostrate, densely tufted species, 1–2 in. high. Leaves imbricating on the short branches, erecto-patent,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, obovate-spathulate, obtuse, densely clothed on both surfaces with snow-white cottony wool. Head sessile amongst the leaves,  $\frac{1}{3}$  in. diam.; involucrel scales in 2 or 3 series, the inner white, radiating; receptacle very small, narrow; florets about 12, female in 1 series; pappus hairs thickened upwards, rather stout. Achene pubescent.

**Middle** Island: mountains above Lake Hawea; alt. 6000 ft., forming patches; summit of Mount Torlesse and Mount Cook, on shingle, alt. 6500–7000 ft., *Haast*; Otago, lake district, *Hector and Buchanan*. Named in honour of Mr. William Young, Mr. Haast's fellow-traveller and able assistant, both as a surveyor and botanical collector. A beautiful little snow-white plant, intermediate in habit between *Raoulia* and the two preceding *Gnaphalia*.

4. **G. Lyallii**, *Hook. f. Fl. N. Z.* i. 137. Stem very stout, almost woody, prostrate, branched, as thick as a swan's quill; branches stout, erect, leafy, 5–10 in. high, cottony above. Leaves close-set, spreading, 2 in. long,  $\frac{1}{4}$ – $\frac{1}{3}$  broad, narrow oblong-lanceolate, broader upwards, acute, 3-nerved, glabrous above, appressed tomentose beneath. Heads  $\frac{1}{2}$  in. diam., forming dense corymbs, 2–4 in. across; pedicels cottony; involucrel rays very many,  $\frac{1}{4}$  in.



long, white, radiating, with short cottony claws; receptacle plane; florets numerous; female in 2 or 3 series; pappus hairs few, slender. Achene glabrous.

**Middle Island:** Massacre Bay, *Lyall*. A very handsome species, at once known by its robust habit and large leaves, but probably a variety of the following.

5. **G. trinerve**, *Forst.*;—*Fl. N. Z.* i. 138. Stem rather slender and branches 6–24 in. long, ascending, glabrous or cobwebby, produced into bracteate peduncles. Leaves lax, uniform, flat, spreading or recurved,  $\frac{1}{2}$ –1 in. long, obovate- or spathulate-lanceolate, acute or apiculate, faintly 3-nerved, glabrous above, white with appressed wool below. Heads 3–5, corymbose at the ends of the produced, slender, peduncle-like branches,  $\frac{2}{3}$  in. diam.; pedicels slender or short and stout; inner involucre scales numerous, white, radiating, clawed,  $\frac{1}{4}$  in. long. Achene and pappus as in *G. Lyallii*.

**Middle Island:** Dusky Bay, *Forster*; Milford Sound, *Lyall*; Dunedin, on sand dunes, abundant, *Lindsay*, etc. The Ruahine mountain plant referred to this in *Fl. N. Z.*, is, I am now sure, a var. of *G. Keriense*.

6. **G. Keriense**, *A. Cunn.*;—*Fl. N. Z.* i. 138. A very variable plant, smaller than either of the above. Stems prostrate, with slender or stout, ascending, leafy branches, 2–6 in. high, produced into bracteate peduncles. Leaves spreading, very variable,  $\frac{1}{2}$ –2 in. long,  $\frac{1}{10}$ – $\frac{1}{3}$  in. broad, from narrow-linear to oblong-spathulate or lanceolate, acute, 1- rarely 3-nerved. Heads numerous, corymbose, on cottony pedicels, like those of *G. trinerve*, but much smaller,  $\frac{1}{3}$  in. diam.—*Helichrysum micranthum*, *A. Cunn.* in *DC. Prodr.*; *G. dealbatum*, *Forst. Prodr.*?

Var. *B. linifolia*. Stems erect. Leaves excessively narrow; pedicels capillary.

**Northern Island:** very abundant in moist places, falls of the Keri-Keri river, and elsewhere. **Middle Island:** near Nelson, *Travers*; Dusky Bay, *Lyall*; var.  $\beta$ , banks of the Manawatu and Ruahine range, *Colenso*.

7. **G. (Helichrysum) Sinclairii**, *Hook. f., n. sp.* A small, subalpine species; stems and branches ascending, leafy, 2–4 in. high. Leaves close-set, spreading,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long,  $\frac{1}{6}$  broad, linear-oblong or obovate-spathulate, obtuse, densely covered with pale, cottony tomentum on both surfaces. Heads  $\frac{1}{4}$  in. diam., in numerous, rounded, terminal, dense corymbs,  $\frac{1}{3}$ –1 in. across; peduncles and pedicels short, densely cottony; outer scales of involucre cottony, inner shortly radiating; female florets in 1 series; pappus of few stout hairs, thickened towards the tip. Achene glabrous.

**Middle Island:** Upper Awatere valley, *Sinclair*. Very closely allied to the *Raoulia catipes* of Tasmania, but the leaves are much smaller, and the heads not half the size, and much more numerous.

8. **G. filicaule**, *Hook. f.*;—*Helichrysum*, *Fl. N. Z.* i. 140. t. 36 B. Stems usually simple, very slender, flexuose, cottony, 6–10 in. high, terminating in a filiform peduncle. Leaves scattered,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, obovate-oblong, obtuse or apiculate, glabrous above, white and cottony beneath. Heads solitary,  $\frac{1}{3}$  in. diam.; involucre scales numerous, linear, scarious; outer cottony at the base; receptacle small, convex; pappus of very slender filiform hairs. Achene puberulous.

**Northern Island:** dry hills towards the east coast; Wairarapa valley, Cape Kidnapper,

and Puhutai, *Colenso*. **Middle** Island?, *Banks and Solander*; Canterbury, *Haast*; Otago, grass flats in the lake district, *Hector and Buchanan*.

9. **G. Traversii**, *Hook. f., n. sp.* A small, slender, erect, almost simple plant, 2–3 in. high; stem and leaves on both sides covered loosely with snow-white cottony wool. Leaves radical, petiolate, spreading,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, spathulate-obovate. Head solitary,  $\frac{1}{2}$  in. diam., on a scapiform slender stem, with 2 or 3 linear bracts; involucre scales numerous, linear, scarious, hyaline, shining, outer cottony at the base, inner with erect paler tips; receptacle flat; pappus hairs excessively fine. Achene puberulous.

**Middle** Island: Wairau mountains, alt. 3–4000 ft., *Travers*; alps of Canterbury, *Haast*. Mueller has sent this same plant from the Victorian alps, as *G. involucreatum*, var. *monocephalum*, but besides the totally different habit it differs from that plant in the heads not being bracteate and twice as large, and in the looser cottony tomentum.

10. **G. nitidulum**, *Hook. f., n. sp.* A small, densely tufted species, covered with appressed, silky, shining, yellowish tomentum. Leaves closely imbricated at their bases, above spreading, flat,  $\frac{1}{3}$  in. long, linear, obtuse; lower  $\frac{1}{3}$ , membranous, glabrous, upper  $\frac{2}{3}$  densely silky. Heads terminal, solitary, large,  $\frac{1}{2}$  in. broad, on very short, slender peduncles; involucre scales in 2 series, erect, linear, hyaline, shining, with pale erect tips; florets not seen.

**Middle** Island: Nelson mountains, *Sinclair*; Clarence and Wairau valleys, alt. 3500 ft., *Travers*.

11. **G. luteo-album**, *Linn.*;—*Fl. N. Z.* i. 139. Stems simple or branched from the base, erect or ascending, 6–18 in. high, and leaves densely covered with cottony tomentum. Leaves scattered,  $\frac{3}{4}$ –2 in. long, narrow-linear or linear-spathulate. Heads fascicled,  $\frac{1}{8}$  in. long, fascicles collected in corymbs, dusky-yellow, cottony at the base; involucre scales erect, tips incurved, numerous, linear-oblong, scarious, hyaline, shining.

**Northern** and **Kermadec** Islands; very common in some places, rarer in the **Middle** Island; Kowai valley and Rangitata ranges, *Haast*; sand dunes, Dunedin, *Lindsay*; Otago, lake district, *Hector and Buchanan*. **Lord Auckland's** group, *Lyall*. A very abundant tropical weed.

12. **G. (Helichrysum) Colensoi**, *Hook. f.*;—*Helichrysum Leontopodium*, *Fl. N. Z.* i. 141. t. 37 B. A tufted, alpine, very silky species. Stems ascending, 1–4 in. high, terminating in stout woolly bracteate or leafy peduncles 1–2 in. long. Leaves densely imbricate, rosulate, patent or reflexed, flat,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, linear-oblong, subacute, uniformly clothed with silky shining hairs, striate when dry; those on the peduncle smaller and shorter. Heads densely crowded into a bracteate capitulum  $\frac{1}{2}$  in. diam.; bracts many, spreading,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long; ovate-oblong, obtuse, most densely woolly; each head  $\frac{1}{8}$  in. long; involucre scales linear-lanceolate, erect, scarious, shining, woolly at the back; pappus hairs few, stout, scabrid, thickened upwards. Achene silky.

**Northern** Island: Ruahine range and Mount Hikurangi, *Colenso*. **Middle** Island: Tarndale mountains, in shingle, alt. 5000 ft., *Sinclair*.

13. **G. (Helichrysum) grandiceps**, *Hook. f., n. sp.* Densely tufted. Stems ascending, and branches 2–3 in. long, uniformly and densely clothed to the tips with leaves, and terminated by the sessile bracteate heads. Leaves

closely imbricating, small, recurved,  $\frac{1}{4}$  in. long, concave, oblong-spathulate, obtuse, recurved, densely covered with thick white silvery tomentum. Heads and florets in *G. Colensoi*, but bracts shorter.

**Middle Island:** Mount Sinclair; moraines of the Great Clyde glacier; mountains near Lake Hawea, Mountains Cook and Torlesse, alt. 4000–6000 ft., *Sinclair, Haast*; Otago, lake district, subalpine, *Hector and Buchanan*. Allied to *G. Colensoi*, but very different in the small, broad, recurved, closely imbricated, uniform, less silvery leaves, and inflorescence not peduncled.

14. ***G. involucratum*, Forst.**;—*Fl. N. Z. i. 139*. An erect annual. Stems branched at the base, 1–2 ft. high, branches often proliferous, stiff, cottony. Leaves scattered, spreading, often fascicled, 1–3 in. long, narrow-linear or lanceolate, acute, glabrous above, cottony beneath; margins often recurved and wrinkled. Heads small,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, collected into dense axillary and terminal globular balls  $\frac{1}{4}$ –1 in. diam., which are subtended by numerous spreading or reflexed linear foliaceous bracts 1 in. long and of variable breadth; involucrel scales erect, hyaline, linear, acute; female florets numerous, hermaphrodite very few; pappus hairs very slender. Achene glabrous.—*G. virgatum*, Banks and Sol.;—*Fl. N. Z. i. 139*; *G. lanatum*, Forst.; *G. Cunninghamii*, DC.

Abundant throughout the islands, in waste places, *Banks and Solander*, etc.. The *G. virgatum*, B. and S., not to be distinguished even as a variety I fear. Abundant in Australia and Tasmania.

15. ***G. collinum*, Labill. Fl. Nov. Holl. t. 189**;—*Fl. N. Z. i. 139*. Perennial, roots with runners. Stems scapiform. Leaves chiefly radical, petiolate, 2–4 in. long, lanceolate-spathulate, acuminate, covered with cottony wool on both surfaces. Scape 4–8 in. high, slender, white and cottony; bracts 2 or 3, foliaceous. Heads as in *G. involucratum*, but collected into a smaller fewer-headed subglobose capitulum, with only 1 or 2 linear bracts at their base.—*G. simplex*, Forst.?

**Northern Island:** dry hills, Bay of Islands, east coast, etc. **Middle Island:** not uncommon in the Canterbury district; Otago, lake district, *Hector and Buchanan*. Though extremely dissimilar in its typical state from *G. involucratum*, I find now so many almost intermediate forms, that I suspect their permanent difference, and am disposed to refer the vars.  $\beta$  and  $\gamma$  of the N. Z. Flora to that plant.

### 15. **HAASTIA**, Hook. f., nov. gen.

Very densely tufted, low, woolly herbs, forming balls or cushions on the lofty mountains. Leaves crowded, broad. Flower-heads large, solitary, terminal, sunk amongst the uppermost leaves.—Involucrel scales in 2 series, very numerous, narrow, herbaceous with scarious tips, free or connate at the base, acuminate. Receptacle narrow, flat, papillose. Florets of circumference in 2 or more series, female; corolla very short, slender, tubular, with a crenulate mouth; styles with very long exerted arms, papillose at the tips. Florets of disk very numerous, funnel-shaped, hermaphrodite; arms of style shorter; anthers without tails. Pappus of 1 series of rather rigid, white, slender, scabrid hairs, thickened towards the tip. Achene compressed, linear or oblong, even or grooved.

A very singular and distinct genus, differing from the other Gnaphalioid *Compositæ* in the tailless anthers.



Leaves most densely imbricate, 3-nerved, crenulate. Pappus hairs free. 1. *H. pulvinaris*.  
 Leaves laxly imbricate, recurved. Pappus hairs united below . . . 2. *H. recurva*.  
 Leaves laxly imbricate, suberect. Pappus hairs free . . . 3. *H. Sinclairii*.

1. ***H. pulvinaris*, Hook. f.** Plants forming dense hemispheres or cushions, 3 ft. across, covered with fulvous wool; branches with the leaves on as thick as the thumb. Leaves patent,  $\frac{1}{2}$  in. long, crenulate, most densely imbricate, broadly obtuse, with dilated rounded tips, margins recurved towards the tip, membranous, 3-nerved when the wool is removed. Heads  $\frac{1}{3}$  in. broad. Pappus hairs free to the base. Achene glabrous.

**Middle** Island; Kaikora mountains, and Mowatt's Mountain, alt. 5000 ft., *Sinclair*; Discovery Peaks, alt. 5800 ft., *Travers*. One of the most extraordinary plants in the islands. *Sinclair* says the patches are so dense, that the finger cannot be thrust between the branches.

2. ***H. recurva*, Hook. f.** More laxly tufted, as densely covered with wool, which is more rufous when dry. Leaves loosely imbricating,  $\frac{1}{2}$  in. long, obovate-spathulate, recurved. Heads  $\frac{1}{2}$  in. diam. Pappus hairs paleaceous and united at the base. Achene glabrous.

**Middle** Island: shingle-beds above 5000 ft., Tarndale, *Sinclair*; Discovery Peaks, alt. 5800 ft., *Travers*; Mount Torlesse, alt. 6000 ft., *Haast*.

3. ***H. Sinclairii*, Hook. f.** Loosely tufted, branches ascending, erect, covered with paler cottony wool. Leaves erect, imbricating,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, oblong-obovate or rounded-obovate, obtuse, not recurved, 5–7-nerved. Head  $\frac{1}{3}$ –1 in. diam.; involucre scales broader than in the preceding species. Pappus hairs free to the base. Achene glabrous.

**Middle** Island: shingle beds, alt. 4–6000 ft., Wairau and Awatere mountains, and at the Wairau pass, *Sinclair*; Mounts Darwin and Cook, *Haast*; Mount Brewster, dry debris, alt. 6000 ft., *Hector and Buchanan*.

## 16. ERECTITES, Rafinesque.

Tall, perennial, glabrous or cottony herbs. Leaves alternate, simple or runcinate-pinnatifid.—Heads corymbose, bracteolate, very narrow, cylindric or bell-shaped; involucre scales in 1 series, herbaceous, narrow linear, appressed. Receptacle papillose. Florets of circumference in 2 or more series, female, excessively slender, tubular, 2–4-toothed; of the disk hermaphrodite, campanulate above; anthers without tails; arms of style with short terminal cones. Pappus in many series of excessively slender, soft, roughened hairs. Achene oblong, striated, glabrate or hispid, obtuse or narrowed at the tip, terminated by a disk-like thickened top.

A small genus, the species are natives chiefly of Australia and Tasmania; a few others are American and Indian.

Glabrous. Leaves toothed or pinnatifid. Achene slender . . . 1. *E. prenanthoides*.  
 More or less cottony. Leaves pinnatifid. Achene short . . . 2. *E. arguta*.  
 Hispid, except the heads and pedicels . . . 3. *E. scaberula*.  
 Cottony and white. Leaves linear, long, with revolute margins . . . 4. *E. quadridentata*.

1. ***E. prenanthoides*, DC.**—*Fl. N. Z.* i. 141. A tall, glabrous, simple or branched herb, 1–3 ft. high, rarely slightly hairy. Leaves 3–6 in. long, linear-oblong or lanceolate, lower petiolate, upper sessile with auricled bases, toothed lobed or pinnatifid. Corymb lax; heads quite glabrous, nu-



merous, on very slender pedicels, each  $\frac{1}{4}$ – $\frac{1}{3}$  in. long; involucre scales green with white margins. Achenes slender, grooved.—*Senecio*, A. Rich.

Not uncommon in moist woods, etc., throughout the islands, *Banks and Solander*, etc. A common S. Australian and Tasmanian plant.

2. ***E. arguta*, DC.**;—*Fl. N. Z.* i. 142. A stout, erect herb, 1–2 ft. high, more or less cottony, especially on the leaves below. Leaves 2–4 in. long, linear-oblong or lanceolate, irregularly pinnatifid and toothed, sessile and auricled at the base. Heads corymbose, numerous, small; florets  $\frac{1}{4}$  in. long; involucre scales cottony below, shorter than the florets. Achene short, grooved, hispidulous.—*Senecio argutus*, A. Rich.

Common throughout the islands, *Banks and Solander*, etc. Abundant in Tasmania and Southern Australia.

3. ***E. scaberula*, Hook. f., n. sp.**;—*E. hispidula*, *Fl. N. Z.* i. 142, not DC. A slender, erect herb, 1–1½ ft. high, hispid all over, except the pedicels and involucre. Leaves 1–3 in. long, linear-oblong or lanceolate, toothed or pinnatifid, sessile. Heads  $\frac{1}{4}$  in. long, laxly corymbose or divaricating. Achene linear, indistinctly grooved, pubescent.

**Northern and Middle Islands**: in various places, but so common as *E. arguta* and *quadridentata*. This differs from the Tasmanian *E. hispidula*, in the achene only  $\frac{1}{2}$  in. long, and not attenuate at the top, also in the smaller glabrous heads, and short involucre scales.

4. ***E. quadridentata*, DC.**;—*Fl. N. Z.* i. 142. A stout species, 1–3 ft. high, sometimes woody below, more or less covered with cottony wool, often snow-white all over. Leaves 2–6 in. long, very narrow linear, margins revolute. Heads corymbose, numerous, very narrow,  $\frac{1}{3}$  in. long; involucre scales glabrous or cottony. Achene grooved and angled, hispid,  $\frac{1}{2}$  in. long.—*Senecio quadridentatus*, Lab. *Fl. Nov. Holl.* t. 194.

Abundant throughout the islands, *Banks and Solander*, etc. Also frequent in Southern Australia and Tasmania.

I have a specimen of another *Erechtites* from the bed of the Godley river, alt. 3000 ft., *Haast*, apparently differing from any of the above, but too imperfect to determine; it is nearly glabrous, with narrow, linear-oblong, slightly toothed, coriaceous leaves, 1–2 in. long, sparingly cottony below, not auricled at base: heads glabrous, immature.

## 17. **SENECIO**, Linn.

Herbs shrubs or trees, of very various habit. Leaves entire toothed lobed or pinnatifid. Flower-heads bracteate at the base, corymbose, rarely solitary.—Involucre scales in 1 or 2 rows, linear, erect, herbaceous or coriaceous, rarely scarious, often brown at the tip. Receptacle plane or tumid, papillose or alveolate. Florets yellow, all similar and hermaphrodite, or the outer series female and ligulate; the inner tubular, campanulate above, hermaphrodite. Anthers with very short tails or 0. Pappus of 1 or several rows of soft or stiff, smooth or scabrid, equal or unequal, slender or stout hairs, sometimes thickened at the tips. Achene linear-oblong, never beaked, usually with a thickened disk-like top, terete or grooved.

One of the largest genera in the vegetable kingdom, found in all parts of the world, and containing a multitude of dissimilar, always most variable species. I have classed the New

Zealand ones into natural groups, which are, in point of habit and many other characters, the equivalents of genera in other parts of the vegetable kingdom, but which cannot be made genera of, because of the numberless connecting forms found in other countries. *S. Forsteri*, of Fl. N. Z., differs from all others in the scarious involucreal scales, and hence I have restored it to the genus *Brachyglottis*, of Forster. The shrubby tomentose species, with very rigid, coriaceous, almost woody involucre, also form a peculiar set, for the most part; but *S. Greyi* and *Munroi*, which should belong to the same group, have membranous scales. The New Zealand species are excessively variable, the first four may prove one, the remainder seem distinct enough.

1. *Scapigerous herbs. Leaves all broad, radical. Scapes 1- or many-headed. Outer florets rayed. Involucreal scales in about 2 series. Achenes glabrous. Pappus hairs white, slender.*

Leaves 1-4 × 1-3 in., rugose and hispid above, woolly below. Scape glandular . . . . .

1. *S. Lagopus.*

Leaves  $\frac{1}{2}$ -4 ×  $\frac{1}{2}$ -1 $\frac{1}{2}$  in., rugose and hispid above, glabrate below.

Scape cottony . . . . .

2. *S. bellidioides.*

Leaves 3-6 × 1-3 in., woolly above and below. Scape glandular . . . . .

3. *S. saxifragoides.*

Leaves 2-5 × 1-3 in., and whole plant cottony, snow-white . . . . .

4. *S. Haustii.*

2. *Branched herbs, usually glabrous. Leaves all or upper sessile and auricled at the base. Heads corymbose. Outer florets rayed (rarely tubular in *S. lautus*). Involucreal scales linear, in 1 series, herbaceous, connate into an obconic base. Achenes ribbed. Pappus of white slender hairs.*

Tall, glabrous. Leaves membranous, ovate, petioled, lobed, and toothed . . . . .

5. *S. latifolius.*

Stout, short, glabrous or glabrate. Leaves 1-2 in., rather fleshy . . . . .

6. *S. lautus.*

Stout. Leaves cottony, white, lobed and toothed . . . . .

7. *S. Colensoi.*

Tall, robust. Leaves leathery, glabrous, toothed, and veined . . . . .

8. *S. odoratus.*

3. *An erect, simple, leafy herb, corymbose above. Heads very large. Involucreal scales 2 series, outer florets' rays very long. Pappus hairs rigid, scabrid* . . . . .

9. *S. Lyallii.*

4. *Shrubby, glabrous. Leaves crowded, linear, margins revolute to the midrib. Head solitary; outer florets with broad rays. Pappus of soft hairs.* . . . . .

10. *S. bifistulosus.*

5. *Shrubs with glabrous or woolly or tomentose or cottony stems, leaves, and involucre. Corymbs branched (heads solitary in *S. cassinioides*). Involucreal scales of 1 series. Receptacle pitted. Outer florets rayed or not. Pappus of rigid, often unequal, scabrid hairs.*

a. *Glabrous or nearly so. Heads corymbose.*

Leaves 2-4 in., linear or oblong-lanceolate. Rays very long . . . . .

11. *S. glastifolius.*

Leaves 1-2 in., orbicular, toothed. Rays very short . . . . .

12. *S. sciadophilus.*

Leaves 1-1 $\frac{1}{2}$  in., oblong, crenate-toothed. Rays short . . . . .

13. *S. perdicoides.*

β. *Leaves quite entire, very coriaceous indeed, covered on both surfaces or below with tomentum. Heads panicled or corymbose.*

Leaves 2-4 in., oblong, softly cottony below. Rays long . . . . .

14. *S. Greyii.*

Leaves 2-4 in., oblong, with appressed brown tomentum below. Ray 0 . . . . .

15. *S. elaeagnifolius.*

Leaves 2-6 in., orbicular, with brownish tomentum below . . . . .

16. *S. rotundifolius.*

Leaves  $\frac{3}{4}$ -1 in., oblong, with whitish tomentum below . . . . .

17. *S. Bidwillii.*

γ. *Leaves crenate, undulate, white and cottony below* . . . . .

18. *S. Munroi.*

δ. *Leaves  $\frac{1}{2}$  in. Heads solitary* . . . . .

19. *S. cassinioides.*

1. ***S. Lagopus*, Raoul, Choix, 21. t. 17;—Fl. N. Z. i. 143.** Root of stout fibres; crown loaded with long, woolly, matted hairs. Leaves 1-4 in. long, on short, stout, villous petioles, broadly cordate-oblong, rounded at the tip, even or crenulate on the margin, densely clothed below with white wool, rugose above, and covered with short scattered bristles. Scape 2-6 in. high, branched above, bracteate, 2-8-headed, and involucre pubescent and pilose with black glandular hairs. Heads on slender pedicels,  $\frac{1}{2}$ -1 in. diam., broadly

obconic; involucreal scales tomentose; rays  $\frac{1}{4}$ – $\frac{1}{3}$  in. long; pappus hairs white, slender, unequal. Achene linear, slender.

**Northern and Middle Islands:** subalpine pastures and rocky places, Ruahine mountains, *Colenso*; Nelson, *Bidwill*, *Sinclair*, *Munro*; Canterbury, *Raoul*, *Lyall*. This and the two following, though most dissimilar in their usual states, appear to me to be united by intermediate forms.

2. ***S. bellidioides***, *Hook. f. Fl. N. Z.* i. 145. Smaller than *S. Lagopus*, quite similar in habit and woolly crown, but the petioles often more slender. Leaf  $\frac{1}{2}$ –4 in. long, broadly oblong or linear-oblong or cordate, obtuse at both ends or cordate or acute at the base, entire or crenate, margins often edged with white wool, above rugose and rough with hispid scattered hairs, below glabrate, with raised veins; petioles more or less densely clothed with soft wool. Scapes slender, cottony and glandular, 1–4-flowered. Heads, etc., as in *S. Lagopus*.

*a.* Leaves broad-oblong, glabrous below. Scapes cottony.

*β.* Leaves broad-oblong, densely woolly below. Scapes tomentose and glandular.

*γ.* Leaves linear-oblong, glabrate or villous below. Scapes glabrate.

**Middle Island**, abundant in hilly pastures, etc., from Nelson to Otago, *Munro*, etc., ascending to 7000 ft. in the Otago alps, *Hector and Buchanan*.

3. ***S. saxifragoides***, *Hook. f. Fl. N. Z.* i. 144. Much larger than the two preceding, top of root sometimes 1 in. thick, covered with long villous wool. Leaves 3–6 in. long, with short, very stout, woolly petioles, broadly oblong or orbicular, cordate, crenate, villous and silky above, densely woolly below. Scape 2–10 in. high, stout, bracteate, cottony or tomentose, and covered with black, spreading, glandular hairs, 4–10-flowered. Heads  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. diam., as in *S. Lagopus*.

**Middle Island:** Port Cooper, *Lyall*.

4. ***S. Haastii***, *Hook. f., n. sp.* Wholly covered with white, lax or appressed, cottony wool; rootstock woody, covered with soft wool or naked. Leaves with long, slender petioles, 2–8 in. long, blade 2–5 in. long, 1–3 broad, oblong or broad cordate-oblong, obtuse, obscurely crenulate. Scape slender, 8–14 in. high, and peduncles very long, cottony, and slightly glandular. Heads as in *S. Lagopus*.

**Middle Island:** Mount Cook, alt. 2700–4000 ft., shores of Lake Okan, Lake Hawea, and mountains near the sources of the Ahuriri, *Haast*; Otago, lake district, alt. 2–3000 ft., *Hector and Buchanan*. The Lake Okau specimen is more buff-coloured, less cottony; its tomentum is more glandular all over, and shows a tendency to pass into *S. bellidioides*.

5. ***S. latifolius***, *Banks and Sol.*;—*Fl. N. Z.* i. 145. A tall branching glabrous herb, 2–3 ft. high. Stems flexuose, furrowed. Leaves membranous, 4–8 in. long, very variable, lower on long winged petioles with toothed auricles, oblong, lobulate and toothed; upper more fiddle-shaped or ovate-oblong, acute, contracted below the middle and again expanding into toothed auricles, 1 in. broad; in young specimens the leaves are scaberulous, lanceolate, and toothed. Heads  $\frac{1}{2}$  in. diam., in large corymbs with spreading branches; involucreal scales short, in 1 series, linear, acuminate; rays slender,  $\frac{1}{4}$  in. long; pappus very soft, white, slender. Achene strongly ribbed, hispidulous.



**Northern Island:** in wooded districts, *Banks and Solander, Dieffenbach, Bidwill;* Wairarapa, Hawke's Bay, and Ruahine range, *Colenso.*

6. **S. lautus**, *Forst.*;—*Fl. N. Z.* i. 145. An excessively variable, perfectly glabrous or slightly cottony, branched herb, 6 in. to 2 ft. high. Stem stout, grooved, green, flexuose. Leaves 1–2 in. long, sessile with amplexicaul auricles, or petioled, rather fleshy, ovate-oblong or linear, entire toothed lobed or pinnatifid; lobes long or short, broad or narrow. Heads in few-flowered corymbs,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., broad-campanulate; involucre scales linear, acuminate; outer florets with short revolute rays, rarely 0; pappus fine, soft, white. Achene glabrous, ribbed or puberulous.—*S. neglectus* and *S. rupicola*, A. Rich. *Fl. t.* 37.

A most abundant plant, especially on maritime rocks and sands, ascending the mountains to 6000 ft., *Banks and Solander.* Some Otago mountain specimens are slightly cottony, but none others that I have seen. Equally abundant in Tasmania and South Australia.

7. **S. Colensoi**, *Hook. f. Fl. N. Z.* i. 147. An erect, much-branched herb, covered with white cottony or cobwebby tomentum, except peduncles and heads. Stem flexuose, grooved. Leaves 1–4 in. long, coriaceous, linear-oblong, lyrate or contracted in the middle, sessile with broad auricled bases, deeply irregularly toothed or lobulate, obtuse or acute, tomentose on both surfaces. Heads few, corymbose,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, broadly campanulate; rays short, revolute. Achene small, grooved, silky.

**Northern Island:** cliffs near the sea, Bay of Islands, East Cape, and Cape Kidnapper, *Colenso.* This has the cottony tomentum and much the appearance of *Erechtites arguta*. I have immature specimens from *Colenso* of a variety or an allied species, covered with loose coarse white tomentum.

8. **S. odoratus**, *Hornemann.*—*S. Banksii*, *Fl. N. Z.* i. 146. A perfectly glabrous or sparsely pilose, tall, slender or very robust plant, 2–5 ft. high. Stem flexuose, grooved. Leaves coriaceous, sessile, with auricled amplexicaul bases, 2–4 in. long,  $\frac{1}{2}$ –2 in. broad, broadly oblong to lanceolate, acute or acuminate, strongly veined. Heads small,  $\frac{1}{4}$  in. long, corymbose on slender pedicels, broadly campanulate; rays short, revolute. Achene slender, grooved, pubescent.

**Northern Island:** east coast, *Banks and Solander*; on maritime cliffs, *Colenso.* Also found in South Australia and Tasmania, where the leaves are sometimes cottony.

9. **S. Lyallii**, *Hook. f.*—*S. Lyallii* and *S. (?) scorzonerioides*, *Fl. N. Z.* i. 146. Glabrous, or glandular-pubescent. Rootstock very thick, crowned with long silky hairs. Stem stout, simple, erect, 1–2 ft. high, leafy, ending in a branched corymb of many flower-heads. Leaves all quite entire; radical petiolate, oblong-lanceolate or very narrow linear, 2–10 in. long,  $\frac{1}{2}$ – $\frac{2}{3}$  broad, subacute, 1–5-nerved, cauline numerous, sessile, stem-clasping, gradually narrowed from the base to the obtuse tip. Branches of corymb (peduncles) simple, bracteate. Heads large, 1–2 in. diam.; involucre broadly turbinate, scales in 1 series, linear, pubescent; rays  $\frac{1}{2}$ –1 in. long; pappus of rigid, dirty-white, unequal scabrid hairs. Achene narrow, silky, ribbed.

**Middle Island:** west coast, Milford Sound and Dusky Bay, *Lyall*; abundant on the alps, ascending to 5000 ft., *Munro, Sinclair, Travers, Haast*, etc. A truly magnificent, but excessively variable plant. *Buchanan* observes that the flowers vary in colour from salmon-colour to bright-yellow. *S. scorzonerioides* is a very broad-leaved, glandular state.



10. **S. bifistulosus**, *Hook. f. Fl. N. Z. i. 145.* Glabrous? Stem woody; branches scarred like a pine-branch. Leaves densely crowded, spreading, 1 in. long,  $\frac{1}{12}$  broad, narrow-linear, margins revolute to midrib and united to it by their woolly borders, appearing crenate from the impressed veins. Flowering branch or scape from below the leaves, 4 in. long, with foliaceous bracts. Head  $1\frac{1}{4}$  in. diam.; involucre scales few, broad, cottony at back; rays few, broad; pappus very soft. Achene short, glabrous, ribbed.

**Middle Island**: Dusky Bay, *Lyall*. A very curious plant, allied to no other in New Zealand, but apparently to the Tasmanian *S. pectinatus*. I have but one specimen.

11. **S. glastifolius**, *Hook. f. Fl. N. Z. i. 147. t. 39.* A perfectly glabrous, branched, woolly shrub, 6–10 ft. high. Branches brittle, stout or slender; bark pale-brown. Leaves shortly petioled, 2–4 in. long,  $\frac{1}{3}$ –1 broad, oblong or lanceolate, entire or sinuate-toothed, acute or obtuse; nerves very faint, brown when dry. Corymbs lax, much spreading; bracts leafy. Heads large,  $1\frac{1}{2}$ –2 in. diam.; involucre broad-campanulate, scales broadly linear, membranous; rays few, very long,  $\frac{1}{2}$ – $\frac{3}{4}$  in.; anthers with short tails; pappus hairs rigid, unequal, scabrid, dirty-white. Achene glabrous, terete, expanded and thickened at the tip.—*Solidago arborescens*, A. Cunn., not Forst.

**Northern Island**: in woods, from the Thames river northward, *Banks and Solander*, etc. A curious plant, in many respects allied to the Tasmanian *Centropappus Brunonis*.

12. **S. sciadophilus**, *Raoul, Choix, 21. t. 18;—Fl. N. Z. i. 153.* A climbing shrub, perfectly glabrous or sparingly pubescent, with slender flexuose branches. Leaves 1–2 in. long, petiolate, orbicular, coarsely toothed, membranous, brown when dry. Heads in few-flowered corymbs, on slender axillary peduncles, sparingly divided, broadly campanulate,  $\frac{1}{4}$  in. diam.; involucre scales few (8–10) in 1 series, broadly linear, subacute; rays  $\frac{1}{6}$  in. long, revolute; pappus hairs numerous, in several series, rigid, white, scabrid. Achene nearly glabrous, grooved.

**Middle Island**: Akaroa, in woods, *Raoul*.

13. **S. perdicioides**, *Hook. f. Fl. N. Z. i. 149.* A shrub with slender, pubescent, striated, scarred branches. Leaves on slender petioles, quite glabrous, 1– $1\frac{1}{2}$  in. long, ovate-oblong, obtuse, crenate and toothed, finely reticulated on the under surface. Heads obconic,  $\frac{1}{4}$  in. long, 8-flowered, in axillary and terminal corymbs; peduncles pubescent; involucre scales few, broad, obtuse; rays few, broad; pappus of 2 series of scabrid white hairs. Achene oblong, glabrous, deeply grooved.

**Northern Island**: Tolaga, in woods, *Banks and Solander*. This plant has not been found since Cook's voyage, a century ago.

14. **S. Greyii**, *Hook. f. Fl. N. Z. i. 148. t. 38.* A shrub, about 5 ft. high; branches terete, woody, and petioles and leaves below covered with white appressed tomentum. Leaves with petioles  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, blade 2–4 long, oblong, obtuse, coriaceous, quite entire, unequal at the base, under side thickly softly cottony, upper glabrate, nerveless, edged with white. Corymbs large, terminal, paniced, drooping; bracts large, foliaceous, sessile, obovate-oblong, cottony or glabrate; peduncles either white and cottony or not cottony and densely glandular-pubescent. Heads campanulate,  $\frac{1}{2}$  in. long;

involucral scales thick, linear, acute; rays  $\frac{1}{4}$ – $\frac{1}{2}$  in. long; anthers with short tails; pappus of many series of rigid scabrid white hairs. Achene silky.

**Northern** Island: from Pawahati, Cape Palliser, to Pahawa, in rocky and stony places, *Colenso*. A very beautiful plant.

15. ***S. elæagnifolius***, *Hook. f. Fl. N. Z.* i. 150. t. 41. A small, robust shrub, 6–8 ft. high; branches stout and petioles and leaves beneath densely covered with an appressed smooth layer of dirty-white or buff tomentum. Leaves with stout petioles,  $\frac{1}{2}$ –1 in. long, obovate or lanceolate-oblong, obtuse, coriaceous, quite entire, glabrous and obscurely veined above. Panicle terminal, stout, branched, and involucre densely covered with thick buff wool. Heads  $\frac{1}{3}$  in. long, campanulate; involucral scales very coriaceous and woolly; ray 0; anthers tailed; pappus rigid, scabrid, white. Achene grooved, pubescent.

**Northern** Island: woods on the Ruahine mountains, *Colenso*: Mount Egmont, alt. 6000 ft., *Dieffenbach*. **Middle** Island: Rangitata range and Mount Cook, alt. 3–4000 ft., *Sinclair*, *Haast*; Otago, in the bush, rare, *Hector* and *Buchanan*.

16. ***S. rotundifolius***, *Hook. f. Fl. N. Z.* i. 149. A small tree with very robust branches, covered as are the petioles, leaves below, and inflorescence with buff tomentum. Leaves with stout petioles 1–3 in. long, blade 3–6 in. diameter, orbicular, unequal or rounded or cordate at the base, very coriaceous, shining above with reticulate veins, margin tomentose. Corymbs terminal, short, close, much branched. Heads very numerous, cylindric-campanulate,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long; involucral scales very thick, woolly; rays extremely short; anthers without tails; pappus hairs rigid, scabrid, white. Achene glabrous, grooved.—*Cineraria rotundifolia*, Forst.

**Middle** Island: Dusky Bay, *Forster*; Milford Sound, *Lyall*. Closely allied to the last, though differing in the large orbicular leaves and the glabrous achene. The Mount Egmont plant referred to this in *Fl. N. Z.* is certainly *S. elæagnifolius*.

17. ***S. Bidwillii***, *Hook. f. Fl. N. Z.* i. 150. A small, very robust, alpine shrub. Branches, petioles, and leaves below densely covered with appressed, whitish tomentum. Leaves shortly petioled,  $\frac{1}{3}$ –1 in. long, oblong or obovate-oblong, extremely thick and coriaceous, round at the tip, glabrous above, nerveless or reticulated; petioles  $\frac{1}{8}$ – $\frac{1}{3}$  in. jointed on to the branch. Corymbs with many long-peduncled heads, sometimes abbreviated; peduncles and heads with softer, more woolly tomentum than the leaves below. Heads campanulate,  $\frac{1}{4}$  in. long; involucral scales very thick; rays few, very short; anthers shortly tailed; pappus hairs white, rigid, scabrid. Achene grooved, glabrous.

**Northern** Island: Mount Hikurangi, and Ruahine range, *Colenso*. **Middle** Island: mountains of Nelson, alt. 6000 ft., *Bidwill*, *Rough*; Discovery Peaks, alt. 5800 ft., *Travers*.

18. ***S. Munroi***, *Hook. f. Fl. N. Z.* ii. 333. A woody shrub, or small tree; branches, petioles, and leaves below covered with white appressed tomentum. Leaves petioled,  $\frac{1}{3}$ –1 in. long, narrow oblong, obtuse, glabrous or viscid above, coriaceous, margin wrinkled and crenate; petiole  $\frac{1}{4}$ – $\frac{1}{3}$  in. long. Corymbs lax, terminal, leafy; peduncles and pedicels tomentose, the latter and involucre glandular and pubescent. Head broadly turbinate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam.; involucral scales spreading, few, short, membranous, obtuse; rays

nearly  $\frac{1}{4}$  in. long, revolute; anthers very shortly tailed; pappus hairs white, rather slender, scabrid. Achene grooved, pubescent.

**Middle Island:** Nelson mountains, *Munro*; Upper Awatere valley, *Sinclair*.

19. **S. cassinioides**, *Hook. f., n. sp.* A small, woody, very robust, small-leaved shrub; branches stout, covered with deciduous bark, marked, like a pine-tree, with scars of fallen leaves. Leaves imbricate,  $\frac{1}{8}$ – $\frac{1}{5}$  in. long, sessile, linear-oblong, obtuse, coriaceous, covered below, like the branchlets and involucre, with yellowish very appressed tomentum. Heads solitary, sessile, terminal,  $\frac{1}{3}$  in. long; involucre scales in 1 series, broadly linear, obtuse, coriaceous, with membranous margins, much shorter than the florets; rays very short, revolute; anthers scarcely tailed; pappus of rigid, scabrid white hairs. Achene grooved, glabrous.

**Middle Island:** Wairau Pass, alt. 5000 ft., and Rangitata river, alt. 3000 ft., *Sinclair*; Godley river, alt. 4–5000 ft., *Haast*. A remarkable species, resembling *Cassinia Favuilliersii*.

## 18. BRACHYGLOTTIS, Forst.

A tree. Leaves very large, tomentose below, as are the branches.—Heads small, excessively numerous, disposed in very large branching panicles, campanulate, 10–12-flowered.—Involucre scales in 1 series, linear, scarious, obtuse, shining, with subulate bracts at the base. Receptacle very narrow, alveolate. Florets of circumference female, irregularly lobed or 2-lipped, outer lip very short broad recurved, inner narrow revolute; of disk tubular, campanulate above. Anthers with short tails. Arms of style truncate, papillose at the tip. Pappus of 1 series of white, rather stout, scabrid hairs. Achene short, terete, papillose.

I have restored this genus of Forster's, because of its very different habit from the other species of *Senecio*, its scarious shining involucre scales and two-lipped ray-florets; the latter, however, vary much in form.

1. **B. repanda**, *Forst. Char. Gen.* 46.—*Senecio Forsteri*, Fl. N. Z. i. 148. A small branching tree, 10–20 ft. high. Branches, petioles, leaves below, and inflorescence covered densely with soft, white, cottony tomentum. Leaves very large, 6–12 in. long, very broadly ovate-oblong or cordate-oblong, irregularly lobed or waved along the margin, membranous, glabrous above; petioles 1–3 in. long. Panicles larger than the leaves, spreading, drooping or erect; branches slender, flexuose. Heads excessively numerous, sessile or pedicelled, minute,  $\frac{1}{8}$  in. long.—*Cineraria repanda*, Forst. Prod.

Abundant in forests throughout the islands, *Banks and Solander*, etc.

## 19. TRAVERSIA, Hook. f., n. g.

Leaves alternate, sessile, serrate, with reticulate venation.—Heads in corymbs, broadly campanulate, 10–12-flowered, bracteolate. Involucre of 1 series of 6–8 broad, oblong, obtuse, erect, spreading, very rigid and coriaceous scales, shorter than the florets. Receptacle sinuous, alveolate. Florets all tubular, campanulate above, with 5 revolute long lobes. Anthers obtuse, without tails, exserted. Arms of style truncate, papillose. Pappus of about 2 series of very rigid, unequal, scabrid, dirty-white hairs. Achene short, glabrous.

A remarkable plant, allied to *Senecio*, but differing remarkably in the rigid pappus, very coriaceous involucre scales, and venation of the leaves, which recalls that of the Juan Fernandez genera, *Balbisia* and *Robinsonia*.

1. **T. baccharoides**, Hook. f. Apparently a small shrub, perfectly glabrous, somewhat glutinous on the leaves and base of the involucre. Branches slender, angled, with raised lines that are decurrent from the leaves. Leaves  $1\frac{1}{2}$ –2 in. long, coriaceous, obovate-lanceolate, serrate, acute, the nerves running nearly parallel to the midrib, and anastomosing. Heads on slender, rigid pedicels, 1–2 in. long, about  $\frac{1}{3}$  in. diam.; involucre scales green, shorter than the florets.

**Middle Island**: Upper Awatere and Wairau valley, alt. 5000 ft., *Sinclair*; Discovery Peaks, 5500 ft., *Travers*.

## 20. MICROSERIS, Don.

Glabrous herbs, with milky juice, perennial roots, linear leaves, and naked scapes.—Involucre narrow, scales in 1 series, slender, with a few short small ones at the base. Receptacle naked, pitted. Florets all ligulate, yellow. Pappus of 1 series of rather rigid, flat, brown hairs, broadest at the base, produced upwards into fine scabrid points. Achene slender, striate, not beaked.

A genus of only two species, a South American one and the present.

1. **M. Forsteri**, Hook. f. *Fl. N. Z.* i. 151. Very variable in size, from 2–12 in. Leaves narrow, flaccid, quite entire toothed pinnatifid or irregularly cut. Scapes glabrous or downy above. Heads  $\frac{1}{3}$ – $\frac{2}{3}$  in. long; involucre scales rather fleshy; borders membranous. Pappus pale yellow-brown.—*Fl. Tasman.* i. 226. t. 66; *M. pygmæa*, Raoul, not Hook.; *Scorzonera scapigera*, Forst.

**Northern and Middle Islands**: common from the Thames river, southward, ascending to 3000 ft. on the mountains. Also found in Tasmania and Southern Australia. This differs from the Chilean species only in the narrower pappus-scales.

## 21. CREPIS, Linn.

Branching or (the New Zealand species) scapigerous herbs, with milky juice.—Heads campanulate, bracteate at the base. Involucre scales in 2 or 3 series, herbaceous, green, outer short, inner longer, often tipped with black. Receptacle naked. Florets all ligulate. Pappus of several series of excessively fine, silky, more or less pilose hairs. Achene linear, not beaked.

A large genus of the north temperate zone, not found in Tasmania or Australia.

1. **novæ-Zelandiæ**, Hook. f., *n. sp.* A scapigerous herb, very variable in stature, 2–12 in. high, glabrous all over, or with the leaves, or scape, or involucre, or all, white and tomentose. Root stout, fleshy. Leaves spreading, gradually widened upwards into a large, entire, obtuse lobe, or linear and pinnatifid to the base, or petioled and lobed along the margin, lobes toothed; sometimes the leaf is pinnatifid to the midrib, with all the lobes toothed, and the alternate smaller. Scape slender, naked, glabrous or tomentose, and studded with long, black, glandular hairs. Heads  $\frac{1}{3}$ – $1\frac{1}{3}$  in.



broad, like those of *Taraxacum*; involueral scales linear, broader at the base, with obtuse black tips, glabrous or cottony and covered with black glandular bristles. Pappus hairs almost simple. Achene short, glabrous, compressed, ribbed.

**Middle Island**: Totara-nui, or Queen Charlotte's Sound, *Banks and Solander*; open hillsides in the Southern Alps, Canterbury plains, ascending to 3000 ft., *Sinclair and Haast*; Tuapeka ranges, Otago, *Lindsay*; lake district, *Hector and Buchanan*. A very curious plant, not well according with any described genus, alluded to as *Hieracium fragile*, Banks and Solander, in the N. Z. Flora, i. 153.

## 22. TARAXACUM, Juss.

Herbs with milky juice and perennial roots. Leaves all radical, spreading, pinnatifid or lobed. Scapes single-headed, hollow.—Involucre of long, erect, herbaceous scales, the outer shorter and usually reflexed. Receptacle naked. Florets all ligulate. Pappus soft, white, of many series of extremely fine unequal hairs. Achene long, ribbed, tapering into a slender filiform beak; the ribs muricate or toothed.

A genus of probably only one species (the "Dandelion"), which varies very greatly, and is found in all parts of the temperate world.

1. **T. Dens-leonis**, Desf.—*Fl. N. Z.* i. 152. An extremely variable weed. Root stout, dark-coloured, bitter. Leaves toothed, sinuate, pinnatifid or runcinate, rarely entire, narrow, linear-obovate, 2–5 in. long, round at the tip. Scapes 2–8 in., leafless, glabrous or pubescent, or woolly above. Heads 1–1½ in. broad, yellow. Involucre green; scales with membranous edges, often thickened at the tip, reflexed after flowering. Achene spreading, the pappus hairs diverging and forming a circle round the top of its beak.

**Northern and Middle Islands**: in various places, ascending the mountains to 5000 ft., *Banks and Solander*, etc. Very variable in foliage and stature, the larger forms are probably introduced with cultivation; the smaller are certainly indigenous.

## 23. PICRIS, Linn.

Erect, hispid, leafy herbs, with milky juice.—Heads corymbose. Involucre campanulate; scales in 2 or 3 series, outer often recurved. Florets all ligulate, yellow. Receptacle naked. Pappus of 1 series of soft, white, plumose hairs. Achene turgid below, narrowed above, with tubercled ridges.

A small European genus, of which one species abounds in many parts of the world.

1. **P. hieracioides**, Linn.;—*Fl. N. Z.* i. 151. Hispid or pilose. Stem 2–4 ft. high. Root-leaves petioled, linear-oblong, obtuse, toothed; cauline smaller, sessile, linear, acuminate. Peduncles slender, pedicels bracteate. Heads ½–¾ in. long; involueral scales hispid and pubescent.

**Northern Island**: dry hills, Bay of Islands, etc. A very common plant in Europe, some parts of Tasmania, Australia, and various other parts of the world.

## 24. SONCHUS, Linn.

Tall leafy herbs, usually with hollow stems and milky juice. Leaves alternate.—Heads corymbose, cylindric or ovoid. Involueral scales imbricate, green, herbaceous, connivent after flowering. Receptacle naked. Florets all

ligulate. Pappus soft, white; hairs simple, excessively fine and silky. Achene flat, not beaked, ribbed or striate.

A genus of many species, natives of temperate countries, and several (*Sowthistles*) are weeds of cultivation.

1. ***S. oleraceus***, *Linn.*;—*Fl. N. Z.* i. 153. An erect, glabrous annual, 2–4 ft. high. Leaves undivided or pinnatifid, toothed and prickly at the margins, with a broad, cordate or triangular, terminal lobe, upper narrow, 2-lobed, and stem-clasping at the base. Heads pale-yellow,  $\frac{2}{3}$ –1 in. diam., corymbose paniced or umbellate.

Var. *a.* Achene glabrous; ribs muricate.

Var. *b.* Achene oblong, broad, winged; ribs smooth.—*S. aspera*, Vill.

Common throughout the islands; var. *a* perhaps only introduced, being a weed of cultivation throughout the world. Var. *b.* Certainly indigenous, being found by *Banks and Solander* and *Forster*, and at Chalky Bay by *Lyall*, and in the interior of the Northern Island by *Colenso*, who says that it was formerly eaten by the natives, but that the introduced variety is preferred from being less bitter. The var. *b.* is a European and Australian plant.

## ORDER XL. STYLIDIEÆ.

Herbs. Leaves alternate, exstipulate. Inflorescence various.—Calyx-tube adnate with the ovary; lobes 5–9. Stamens 2, filaments connate with the style, forming a column; anthers large, transverse. Ovary inferior, crowned with epigynous glands, 1- or 2-celled; style slender, stigma 2-lobed, almost hidden between the anthers; ovules numerous, attached to the septum or to a central axis. Capsule 2-valved, dehiscing downwards, or coriaceous and indehiscent. Seeds minute; albumen fleshy; embryo most minute.

A large Australian Order, extending westwards to Bengal and northwards to China, also found in antarctic America.

Flowers 1–3, on long scapes. Column straight . . . . .	1. FORSTERA.
Flowers solitary, sessile at the ends of the branches . . . . .	2. HELOPHYLLUM.
Flowers 1 or racemed. Column bent towards the top . . . . .	3. STYLIDIUM.

### 1. FORSTERA, Linn.

Small, alpine, glabrous, perennial herbs, with tufted or creeping stems. Leaves small, imbricating or spreading, thick. Scapes terminal, slender, 1–2-flowered. Flowers white, sometimes unisexual.—Calyx 1–3-bracteolate; tube ovoid, lobes 5 or 6. Corolla campanulate or tubular, with spreading limb, 5–9-fid; throat naked or glandular. Epigynous glands 2; style straight, erect. Capsule ovoid. Seeds unknown.

A small genus, confined to the alps of Tasmania, New Zealand, and antarctic America. It is probable that the three following species may be united by intermediates.

Leaves $\frac{1}{2}$ – $\frac{1}{4}$ in., imbricate, obovate, recurved; midrib cuneate . . . . .	1. <i>F. sedifolia</i> .
Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., patent and recurved, linear-oblong; margins recurved . . . . .	2. <i>F. Bidwillii</i> .
Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., patent, not imbricate nor shining; midrib slender . . . . .	3. <i>F. tenella</i> .

1. ***F. sedifolia***, *Linn. f.*;—*Fl. N. Z.* i. 154. Stems very stout, 3–12 in., densely covered throughout their length with leaves. Leaves imbricating, sessile,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, oblong- or obovate-spathulate, obtuse, recurved, very coriaceous, shining, midrib thickened, margin cartilaginous, the lower red-

brown. Scape very slender, strict, 2-4 in., 1- rarely 2-flowered. Flower very variable; bracts linear-oblong. Calyx-lobes linear, obtuse. Corolla  $\frac{1}{4}$ - $\frac{1}{2}$  in. diam.; tube very short; lobes linear-oblong. Stamens included.

**Middle and Southern Islands:** Dusky Bay, *Forster*; Chalky Bay, *Lyall*; Rangitara range, alt. 2500-5000 ft. *Sinclair*; Mount Dobson, 6500 ft., *Haast*; grassy banks, Otago alps, alt. 4-6000 ft., *Hector and Buchanan*.

2. **F. Bidwillii**, *Hook. f. Fl. N. Z. i.* 155. Stems 2-8 in., more slender than in *F. sedifolia*. Leaves numerous, close-set, but not imbricate, patent and recurved,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, linear or linear-oblong, coriaceous, not shining, green; margins recurved when dry; midrib beneath very indistinct. Flowers smaller than in *F. sedifolia*.

**Northern Island:** Tongariro, *Bidwill*; summit of the Ruahine range in shaly places, *Colenso*.

3. **F. tenella**, *Hook. f. Fl. N. Z. i.* 154. Stem short, 1-2 in. Leaves few, lax, erect or patent, not recurved,  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, narrow, oblong-obovate, contracted into a short petiole, subacute, margins recurved, midrib obsolete, not shining nor thickly coriaceous. Scape and flower as in *F. sedifolia*.

**Middle Island:** Otago, on a hill 1800 ft. high, and at Milford Sound, *Lyall*; Southern Alps, *Haast*. Intermediate in some respects between *F. Bidwillii* and *F. sedifolia*, but has shorter stems and less coriaceous foliage than either; the leaves are as short as in *sedifolia*, but neither imbricate, recurved, coriaceous, shining, nor furnished with a thick cuneiform midrib. At the same time I can hardly doubt these three forms having been very recent offshoots from one.

## 2. HELOPHYLLUM, Hook. f.

Densely tufted, moss-like plants. Leaves most closely imbricating, terminated by a globose knob. Flowers solitary, sessile in the uppermost leaves, 2- or 3-bracteate, white or pink, polygamo-dioecious.—Calyx-tube obconic; lobes 5-7, obtuse. Corolla-tube short; limb spreading, unequally 4-9-partite, often with thickened glands at the base of the lobes. Ovary incompletely 2-celled. Epigynous glands 2, semilunar. Fruit small, turbinate, coriaceous, 1-celled, dehiscent only by the falling away of the summit. Seeds numerous, obovoid; testa brown, coriaceous; albumen very fleshy; embryo not seen, probably most minute.

In the 'Flora Antarctica,' I regarded the first-discovered species of this genus as a section (*Helophyllum*) of *Forstera*. I did not then know the fruit, which being turbinate and indehiscent, together with the most peculiar habit of the three species now known, establishes an excellent genus. The three species here described appear very distinct in the drawings sent me by Mr. Buchanan, but I suspect they may prove forms of one very variable plant. There is much in the habit and characters of *Donatia* that approaches this genus, and I think that *Stylidiæ* are more nearly allied to *Saxifragæ* than to any other Order.

Leaves linear, broad at the base. Column scarcely exerted. Flowers white . . . . .	1. <i>H. clavigerum</i> .
Leaves broadly ovate at the base. Column much exerted. Flowers white . . . . .	2. <i>H. Colensoi</i> .
Leaves linear, not broader at the base. Column included. Flowers red . . . . .	3. <i>H. rubrum</i> .

1. **H. clavigerum**, *Hook. f.*;—*Forstera clavigera*, *Fl. Ant. i.* 33. t. 16. Stems 1-2 in. long, with the leaves  $\frac{1}{4}$  in. diam. Leaves erect, densely imbricated all round the stem, linear-oblong, broad at the base,  $\frac{1}{2}$  in. long,

thickly coriaceous; tips globose, shining, bright green, concave above, convex below, with an obscure gland on the back below the tip. Flower  $\frac{1}{6}$ – $\frac{1}{4}$  in. diam., white. Corolla 5–7-cleft. Column very shortly exerted. Stigmas of female flower uncinatæ, plumose; of male obtuse, 4-lobed.

**Middle Island**: alps of Otago, alt. 6000 ft., *Hector and Buchanan*. **Lord Auckland's** group and **Campbell's** Island: abundant on the hills, *J. D. H.*

2. **H. Colensoi**, *Hook. f., n. sp.*—*Forstera clavigera*, Fl. N. Z. i. 155. A smaller species than *H. clavigera*, with very much broader leaves, smaller flowers, and the staminal column much exerted. Flowers minute, usually 5-cleft, suuk amongst the uppermost leaves, white.

**Northern** Island: summits of the Ruahine range, *Colenso*. **Middle** Island: Gordon's Nob, *Munro*; summit of Wairau range, alt. 4500 ft.; crater of a volcano near the lake above Tarndale, alt. 6000 ft., and Rangitata range, *Sinclair*; Mount Torlesse, alt. 4500–6500 ft., *Haast*; Otago alps, alt. 6000 ft., *Hector and Buchanan*.

3. **H. rubrum**, *Hook. f., n. sp.* Habit and size of *H. clavigerum*, but the leaves are narrower, more coriaceous, with larger, thicker knobs. Flowers larger, dark red. Corolla unequally 7-cleft. Column included.

**Middle** Island: Otago, alpine, *Hector and Buchanan*.

### 3. STYLIDIUM, Swartz.

Herbs, usually rigid. Leaves various, chiefly radical.—Corolla irregular, 5-lobed, one lobe smaller and deflexed, the others ascending in pairs. Upper part of the staminal column bent down, and irritable at the flexure, springing up with elastic force when touched, and discharging the pollen.

A very large Australian genus, with one or two East Indian species.

Tall. Flowers spicate . . . . . 1. *S. graminifolium*.  
Short. Flowers solitary . . . . . 2. *S. subulatum*.

1. **S. graminifolium**, *Swartz*;—*Fl. N. Z.* ii. 333. Stems tufted, 8–10 in. Leaves very numerous, all radical, narrow-linear, rigid, grass-like, 2–6 in. Scape 6–18 in., rather stout, pubescent and glandular, edges serrulate to the touch. Spike 3–4 in. long. Flowers rather distant,  $\frac{1}{2}$  in. long, glandular. Calyx-lobes short, obtuse. Corolla-tube shorter than the ovary.—*Bot. Mag.* 44. t. 1918.

**Northern** Island: clay-hills near Auckland, *Bolton*, December, 1851. Only one specimen found, and I suspect introduced; it is a most abundant S.E. Australian and Tasmanian plant.

2. **S. (?) subulatum**, *Hook. f., n. sp.* A small, tufted, subsquarrose plant. Stems excessively short,  $\frac{1}{2}$  in. long. Leaves very closely imbricate at the base, patent and recurved,  $\frac{1}{2}$  in. long, narrow subulate, rigid, pungent, concave above, convex at the back. Scape extremely short, stout, (and ovary) glandular, 1-flowered. Calyx-limb unequally 4- or 5-lobed; lobes short, obtuse. Corolla-tube very short; limb irregularly 3–5-partite; lobes linear, obtuse. Column short, stout, straight? Capsule ovoid,  $\frac{1}{2}$  in. long, 1-celled by the rupture of the septum. Seeds numerous, small, obovoid; testa coriaceous, rugose, brown; albumen very fleshy; embryo minute, globular.

**Middle** Island: Nelson mountains, *Travers*; *Haast*. A very singular little plant, the flowers of which are in a very imperfect state; it resembles *Colobanthus Billardieri*.



*S. spatulatum*, Br., introduced into A. Cunningham's and other catalogues, is an Australian plant.

## ORDER XLI. CAMPANULACEÆ.

(Including LOBELIACEÆ and GOODENIACEÆ.)

Herbs, rarely shrubs. Leaves alternate, exstipulate, entire, rarely pinnatifid. Inflorescence various.—Calyx-tube adnate with the ovary; lobes 5, rarely 2–10, persistent on the fruit. Corolla regular or irregular, usually tubular or campanulate, 5-lobed, often 2-lipped, and split to the base posteriorly; lobes valvate or induplicate. Stamens 5, epigynous, rarely epipetalous; anthers free or united. Ovary inferior, 2–5-celled; style simple, often hairy at the top, 2–5-cleft, or with 2–5 stigmas, the latter sometimes surrounded with a cup, or ring of hairs; ovules few or many. Fruit a capsule berry or drupe. Seeds few or many; albumen fleshy; embryo straight.

A very large Natural Order, found in all parts of the world, but of which the tribe *Goodeniaceæ* is chiefly confined to Australia and the islands of the tropical and southern oceans.

1. CAMPANULACEÆ.—Corolla campanulate, regular. Stamens free. 1. WAHLENBERGIA.

2. LOBELIACEÆ.—Corolla 2-lipped, split to the base posteriorly.

Anthers united.

Tall. Leaves large. Flower racemed. Berry indehiscent . . . 2. COLENSOA.

Erect. Flowers axillary. Capsule coriaceous, 3-valved at the top 3. LOBELIA.

Creeping. Flowers axillary. Berry indehiscent . . . 4. PRATIA.

3. GOODENIACEÆ.—Corolla 1–2-lipped, posteriorly split to the base.

Anthers free.

Creeping herb. Corolla-lobes valvate Berry many-seeded . . . 5. SELLIERA.

Suberect, rather shrubby. Corolla-lobes induplicate. Drupe 2-celled 6. SCÆVOLA.

### 1. WAHLENBERGIA, Schrader.

Erect or ascending, generally slender, simple or branched herbs; juice milky. Leaves alternate. Flowers terminal, regular or nearly so, drooping in bud, white or blue, rarely reddish.—Calyx-lobes 3–5. Corolla campanulate, 5-lobed or -partite. Stamens 5, epigynous; filaments dilated at the base; anthers free. Ovary 2–5-celled; style simple, hairy at the top; stigmas 2 or 3; ovules numerous in each cell. Capsule ovoid or turbinate, opening at the top with 2–5 valves.

A very large genus in Europe, most abundant in South Africa, also found in other parts of the world.

Annual, usually branched. Stems leafy. Corolla 5-cleft . . . 1. *W. gracilis*.

Perennial, glabrous. Leaves all radical; scape naked, 1-flowered. Corolla 5-cleft . . . 2. *W. saxicola*.

Short, stout. Leaves thick, with broad cartilaginous margins. Corolla 5-partite . . . 3. *W. cartilaginea*.

1. ***W. gracilis***, *A. Rich.*;—*Fl. N. Z.* i. 159. A very slender annual, branched, glabrous, hispid or pilose herb. Stem 1–24 in. high, often ascending, angular; branches terminating in very slender, 1-flowered peduncles. Leaves  $\frac{1}{2}$ –2 in. long; radical spatulate, petioled, toothed; cauline sessile, linear-oblong, entire toothed or sinuate, acute or acuminate, rarely spatulate; margins cartilaginous. Flowers extremely variable in size and form. Calyx-

tube ovoid; lobes 3-5, linear, long or short. Corolla  $\frac{1}{6}$ - $\frac{1}{2}$  in. long, blue purplish or white, 3-5-lobed. Capsule elongate, obconic ovoid or club-shaped,  $\frac{1}{8}$ - $\frac{1}{2}$  in. long, ribbed.—*Campanula gracilis*, Forst.; Bot. Mag. t. 691.

Var.  $\alpha$ . Stem tall, generally glabrous. Flowers large. Capsule large, elongate, obconic.

Var.  $\beta$ . *capillaris*. Stem 1-8 in., covered with spreading hairs. Flowers small or minute. Capsule small, ovoid.

Abundant in dry places throughout the islands, *Banks and Solander*, etc., ascending to 4-5000 ft. An equally abundant and variable temperate and tropical Australian and Pacific Island plant, probably not different from an Indian and South African species.

2. **W. saxicola**, *A. DC.*;—*Fl. N. Z.* i. 160. A small, perennial, scapigerous, perfectly glabrous herb, 2-8 in. high. Leaves all radical, petiole, 1-2 in. long, spatulate, obovate lanceolate or narrow-linear, shining, margins often white, entire or toothed. Scape naked, 1-flowered. Calyx-tube turbinate. Corolla oblique, 5-lobed,  $\frac{1}{3}$ - $\frac{1}{2}$  in. diam., pale-blue. Anthers linear-oblong, 1 or 2 of them unguiculate at the tip. Ovary 2- or 3-celled. Capsule obovoid.—*W. albo-marginata*, Hook. Ic. Pl. t. 818; *Campanula saxicola*, Br. Prodr.

**Northern and Middle Islands:** not uncommon in hilly and subalpine districts, ascending to nearly 6000 ft. The Blue-bell of Otago.

3. **W. cartilaginea**, *Hook. f. n. sp.* A small, low, stout, glabrous or pubescent herb, 1-3 in. high. Leaves chiefly radical,  $\frac{1}{3}$ -1 in. long, broadly spatulate, obtuse; petioles broad, thickly coriaceous; margins broad, white, entire, cartilaginous. Scape short, very stout, erect, naked or 1- or 2-leaved, sometimes forked, as if the plant might have a branched stem. Flower large,  $\frac{1}{3}$  in. diam. Calyx-tube subspheric or obconic, lobes large, linear-oblong; margins cartilaginous, longer than the corolla, which is short, broad, and included within the calyx-lobes, and 5-partite almost to the base. Capsule turbinate.

**Middle Island:** Nelson mountains, in shingle-beds, *Rough*; Tarndale, alt. 4000 ft., *Sinclair*; Clarence and Wairau valleys, alt. 4-6500 ft., *Travers*. A highly curious little species. Calyx sometimes 10-lobed. Flower very sweet-scented.

## 2. COLENSOA, Hook. f.

A tall, glabrous, milky herb. Leaves alternate, large, membranous, with very long petioles. Flowers large, racemose.—Calyx-tube turbinate; lobes 5, subulate, equal. Corolla very long, slightly curved, tubular, split to the base down the back, 2-lipped; upper lip of 2 linear-acute lobes, one on either side the fissure, lower of 3 oblong, acute, spreading lobes. Stamens exserted; anthers cohering, pubescent, hairy towards their tips. Ovary 2-celled; style bifid; arms spreading; ovules numerous. Berry globose, fleshy and coriaceous, 2-celled, many-seeded. Seeds small, globose, attached to broad, pelatate placentæ.

This fine plant was separated from *Lobelia* chiefly on account of the baccate fruit.

1. **C. physaloides**, *Hook. f. Fl. N. Z.* i. 157. Stem flexuose, branched, 2-3 ft. high, woody at the base. Leaves with petioles 3-6 in. long, ovate, acute, doubly serrate or toothed, membranous, glabrous or pilose. Racemes terminal, shorter than the leaves, 6-12-flowered; pedicels 1 in., bracteolate at the base.

Corolla 1-2 in. long, blue, pubescent. Berry  $\frac{1}{2}$  in. diam.—*Lobelia physaloides*, A. C.; Hook. Ic. Pl. t. 555-6.

Northern parts of the **Northern** Island, from Wangaroa to the North Cape, *Cunningham*, *Dieffenbach*, etc.

### 3. LOBELIA, Linn.

Erect or ascending, generally glabrous, milky herbs. Leaves alternate. Flowers usually racemose or axillary.—Calyx-lobes 5. Corolla-tube split to the base down the back, rarely of 3 petals, 2-lipped, upper lip of 2 lobes (or two petals when separate), one on each side the fissure, lower with 3 spreading lobes. Anthers connate, 2 upper often pilose at the tip. Ovary 2-celled; style undivided or 2-lobed. Capsule membranous or coriaceous, usually dehiscent by 2 valves at the top.

A very large genus, found in all parts of the world. The corolla is generally split but once to the base, but in *L. Roughii*, the two dorsal petals are free to the base, and it is hence split thrice to the base.

Erect, glabrous. Stems flat or 3-gonous. Flowers small, axillary . . . 1. *L. anceps*.  
Small. Stems very short. Leaves broad, with deep teeth. Flowers on stout  
peduncles, large . . . . . 2. *L. Roughii*.

1. ***L. anceps***, *Thunberg*;—*Fl. N. Z.* i. 158. A branched, leafy, erect or ascending, glabrous, subsucculent herb, 6-12 in. high. Stems flattened, trigonous, sometimes winged. Leaves 1-3 in. long, variable in shape, spatulate linear obovate or oblong, entire sinuate or toothed, narrowed into decurrent petioles. Flowers small,  $\frac{1}{4}$  in. long, pale blue, on short, solitary, axillary peduncles. Ovary elongated. Capsule linear or clavate, often  $\frac{1}{2}$  in. long.

**Northern and Middle Islands**: abundant in wet places, as far south as Banks's Peninsula, *Banks* and *Solander*. **Kermadec Islands**: *McGillivray*, a large leaved form.

2. ***L. Roughii***, *Hook. f., n. sp.* A very short, glabrous, scapigerous plant, full of acrid, milky fluid. Stems branched, very short, slender, tortuous amongst shingle, leafy at the top. Leaves  $\frac{1}{2}$  in. long, shortly petioled, obovate, very deeply toothed or lobed, the sinus round, coriaceous, nerveless. Peduncles stout, erect, axillary, 1-flowered. Calyx-tube globose; lobes linear, coriaceous, obtuse, growing out as the fruit ripens. Corolla-tube 3-partite, about as long as the calyx-lobes, its lobes obtuse, short. Anthers glabrous. Capsule ovoid, globose, leathery,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, dehiscent by cartilaginous valves between the calyx-lobes.

**Middle Island**: Nelson mountains, *Rough*; Wai-au-na valley, alt. 3000 ft., and Wairau Gorge, alt. 4-6500 ft. on shingle, *Travers*. A very curious little species, its habit is that of *Wahlenbergia cartilaginea*.

### 4. PRATIA, Gaudichaud.

Small, creeping, herbaceous plants, with prostrate stems. Leaves small, broad, rounded or oblong, sinuate or toothed. Peduncles axillary, often long, single-flowered.—Flowers the same as in *Lobelia*. Fruit fleshy, indehiscent.

A small genus, natives of marshy places in Australia, Tasmania, India, and temperate South America.

- Stems long. Leaves  $\frac{1}{6}$ – $\frac{1}{2}$  in., obtusely toothed or sinuate . . . . . 1. *P. angulata*.  
 Stems short. Calyx-lobes lanceolate or subulate. Leaves  $\frac{1}{12}$  in. long,  
 sharply deeply toothed . . . . . 2. *P. (?) perpusilla*.  
 Stems stout. Leaves  $\frac{1}{4}$ – $\frac{1}{3}$  in., very broad, fleshy, deeply coarsely  
 toothed . . . . . 3. *P. (?) macrodon*.  
 Stem slender. Leaves  $\frac{1}{6}$  in., orbicular, obtusely toothed or sinuate,  
 purple below. Calyx-lobes  $\frac{1}{16}$  in., triangular, obtuse . . . . . 4. *P. (?) linnæoides*.

1. ***P. angulata***, Hook. f. *Fl. Antart.* i. 41; *Fl. N. Z.* i. 157. Glabrous, very variable. Stems slender, 6–12 in. Leaves  $\frac{1}{6}$ – $\frac{1}{2}$  in. long, petioled or nearly sessile, orbicular, broadly oblong or obovate-oblong, obtusely sinuate-toothed, membranous. Peduncles short or long,  $\frac{1}{2}$ –4 in., slender. Flowers pale-blue,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, sometimes  $\frac{1}{2}$  in. broad. Calyx-lobes linear or triangular-ovate, erect, obtuse. Anthers glabrous. Berry globose or ovoid, sometimes  $\frac{1}{2}$  in. diam.—*Lobelia angulata*, Forst.; *L. littoralis*, A. Cunn.

Var.  $\alpha$ . Leaves orbicular, sinuate-toothed, shortly petioled. Peduncle long and slender. Calyx-lobes short.

Var.  $\beta$ . Leaves obovate, on slender petioles, deeply toothed, acute. Peduncle long. Calyx-lobes long, almost subulate.

Var.  $\gamma$ . Leaves as in  $\alpha$ , but much larger and very obscurely toothed. Peduncles very short.—*P. arenaria*, Fl. Antart. i. 41. t. 29.

Var.  $\delta$ . Smaller. Leaves  $\frac{1}{8}$ – $\frac{1}{4}$  in. long.

Abundant in watery places, moist banks, etc., *Banks and Solander*. Ascending the Southern Alps to 5000 ft. Var.  $\gamma$ . **Lord Auckland's** group. Very nearly allied to the Tasmanian *Lobelia pedunculata*, Br., and possibly only a large form of that plant, but glabrous, the leaves more petioled, less crowded, and the aspect is different.

2. ***P. (?) perpusilla***, Hook. f.—*Lobelia perpusilla*, Fl. N. Z. i. 158. Very minute, glabrous. Stems matted, stout for the size of the plant, 3–4 in. Leaves  $\frac{1}{12}$  in. long, sessile, oblong, acute, deeply toothed. Flowers almost sessile,  $\frac{1}{4}$  in. long. Calyx-tube hairy; lobes ovate-subulate, recurved. Anthers glabrous. Fruit not seen.

**Northern Island**: Hawke's Bay, in mnddy places, *Colenso*. The fruit being unknown, I am doubtful as to the genus; but the habit is altogether that of *Pratia*. Allied to the Tasmanian *Lobelia irrigua*, but a very much smaller plant.

3. ***P. (?) macrodon***, Hook. f., *n. sp.* Perfectly glabrous. Stems matted, short, rather stout. Leaves crowded, very shortly petioled,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, broadly obovate-orbicular, cuneate at the base, coriaceous, deeply coarsely 6–8-toothed. Peduncle short. Flower large. Calyx-lobes subulate-lanceolate. Corolla-tube cylindric,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, broadest at the base. Fruit not seen.

**Middle Island**: Southern Alps, Discovery Peaks, Acheron and Clarence rivers, alt. 5500 ft., *Travers*; summit of Mount Torlesse, alt. 4500–6000 ft., *Haast*. This again is doubtful as to genus till the fruit is known; it differs much from *P. angulata* in the more coriaceous (perhaps fleshy), deeply toothed leaves, large almost sessile flower, and long corolla-tube dilated below.

4. ***P. (?) linnæoides***, Hook. f., *n. sp.* Glabrous; stem slender, creeping, 1–3 in. Leaves coriaceous, very shortly petiolate or sessile, orbicular,  $\frac{1}{6}$  in. diam., coarsely obtusely sinuate-toothed, often purple below. Scape slender,



dark-coloured,  $1\frac{1}{2}$ –2 in. Calyx-lobes very small, broadly triangular, obtuse,  $\frac{1}{16}$  in. long. Corolla  $\frac{1}{2}$  in. long, as in *P. angulata*.

**Middle Island:** Observatory Hill, Macaulay river, alt. 4500 ft., *Haast*; Otago, sub-alpine, Lindis Pass, *Hector and Buchanan*. This approaches small-leaved states of *P. angulata*, but the coriaceous or somewhat fleshy leaves, and very small calyx at once distinguish it, whether as a species or variety.

### 5. SELLIERA, Cavanilles.

A small, glabrous, creeping, rather fleshy herb. Leaves narrow-linear or lanceolate. Peduncles axillary, 1- or 2-flowered.—Calyx-lobes 5, equal. Corolla 1-lipped, split posteriorly to the base; lobes 5, ovate, acute, valvate, not winged. Stamens 5, epigynous; anthers free. Ovary 2-celled; style simple, stigma in a 2-lipped cup; ovules many. Berry 2-celled, indehiscent. Seeds numerous, imbricating upwards, compressed.

1. **S. radicans**, Cav.—*Goodenia repens*, Lab.;—Fl. N. Z. i. 156. Stems succulent, 2–10 in. long. Leaves  $\frac{1}{2}$ –5 in. long, linear-spathulate or linear, obtuse, quite entire, nerveless, petiole half-emasping the stem. Peduncles axillary, solitary or several together, 1- or 2-flowered, with 2 subulate bracts above the middle. Flower  $\frac{1}{2}$  in. long. Berry very variable in size.—Lab. Fl. Nov. Holl. i. 53. t. 76.

Abundant in salt marshes throughout the islands, *Banks and Solander*, etc.; Otago, Lower Waitaki river, *Hector and Buchanan*, apparently far from the sea. Also common in Tasmania, South Australia, and Chili.

### 6. SCÆVOLA, Linn.

Erect or ascending, shrubby or half-shrubby plants. Flowers axillary or spiked.—Calyx-lobes 5, equal or very unequal, sometimes obsolete. Corolla split to the base posteriorly, 1-lipped; lobes induplicate, winged. Stamens 5; anthers free. Ovary 2-(rarely 1–4)-celled; style simple; stigma in a cup; ovules erect, solitary in each cell. Drupe dry or fleshy, usually 2-celled, with 1 erect seed in each cell.

A rather extensive genus in Australia and the Pacific Islands.

1. **S. gracilis**, Hook. f. in *Journ. Linn. Soc. Bot.* i. 129. A proeumbent shrub, covered with silky hairs. Leaves lanceolate or oblong-lanceolate, 1–3 in. long, acute, serrate, hairy on both surfaces. Flowers axillary,  $\frac{2}{3}$  in. long, subsessile, on short branchlets, with 4 linear-lanceolate bracts at their base. Calyx silky, bracteolate; lobes 5, very unequal, 3 subulate, 2 intermediate very short. Corolla yellow, its lobes very long, linear; tube villous within.

**Kermadec Islands**, *M'Gillivray*.

*S. Novæ-Zelandiæ*, A. Cunn., is *Hymenanthera crassifolia*, Hook. f.

## ORDER XLII. ERICEÆ.

(Including EPACRIDÆ.)

Shrubs or trees. Leaves evergreen and coriaceous in all the New Zealand species, simple, exstipulate. Inflorescence various. Flowers usually white, bracteate.—Sepals inferior, usually 5, free or united into a 5-partite calyx,

imbricate. Corolla usually tubular or campanulate, glabrous or bearded on the throat or on the lobes; lobes 5, generally short, imbricate or induplicate-valvate. Stamens 5-10, hypogynous or epipetalous. Anthers 1- or 2-celled, cells awned at the back or tip or awnless, opening by slits or terminal pores. Disk 5-10-lobed, or of 5 scales. Ovary 1-12-celled; style simple, stigma capitate or truncate, simple or lobed. Ovules 1 or many in each cell. Fruit a capsule berry or drupe, free or enclosed in the fleshy calyx. Seeds minute; testa reticulate; albumen copious, fleshy; embryo small.

A large Order, found in all parts of the world.

**SUBORDER I. *Ericææ*.**—*Stamens in the New Zealand genera hypogynous; anthers 2-celled, opening by pores.*

Capsule dry, 5-valved, often enclosed in the fleshy calyx . . . . . 1. GAULTHERIA.  
Berry fleshy, with the small withered calyx at its base . . . . . 2. PERNETTIA.

**SUBORDER II. *Epacridææ*.**—*Stamens in the New Zealand genera epipetalous; anthers 1-celled.*

*Fruit a drupe with a 1-10-celled bony nut; cells with 1 pendulous seed.*

Pedicels covered with imbricating bracts . . . . . 3. CYATHODES.

Pedicels with few bracts placed close under the calyx . . . . . 4. LEUCOPOGON.

*Fruit a drupe, with 5 or more minute 1-seeded nuts* . . . . . 5. PENTACHONDRA.  
*Fruit a many-seeded capsule.*

Leaves not amplexicaul (except *E. purpurascens*). Flowers solitary.

Pedicels covered with imbricating bracts . . . . . 6. EPACRIS.

Leaves not amplexicaul. Flowers racemed. Bracts few or 0 . . . . . 7. ARCHERIA.

Leaves with broad, sheathing bases . . . . . 8. DRACOPHYLLUM.

### 1. GAULTHERIA, Linn.

Shrubs. Leaves coriaceous, toothed, alternate, rarely opposite, never sheathing at the base. Flowers white or pink, axillary solitary or racemose.—Calyx 5- or 6-lobed or -partite, often becoming fleshy and enclosing the capsule. Corolla ovoid or urceolate; mouth contracted; lobes 5, recurved. Stamens 10, included, hypogynous; filaments flat; anthers opening by pores, each pore with 1 or 2 awns. Disk cup-shaped, 10-lobed, or of 10 glands. Ovary 5-celled; cells many-ovuled. Capsule free or enclosed in the baccate calyx, 5-valved loculicidally; valves separating from a central axis which bears the seeds; sometimes the capsule becomes fleshy and indehiscent.

A large genus, especially in the American and Indian mountains, unknown in Europe and Africa, found also on the Australian and Tasmanian alps. The baccate calyx is a variable character in New Zealand, occurring in *G. antipoda*, sometimes on the same fruiting raceme with simple calyces, in which plant further, dry dehiscent, and haccate indehiscent capsules occur also on the same branch, thus uniting the characters of *Pernettya* and *Gaultheria*.

Leaves alternate. Flowers axillary, or racemes leafy . . . . . 1. *G. antipoda*.

Flowers racemose. Leaves lanceolate ohlong or rounded . . . . . 2. *G. rupestris*.

Flowers racemose. Leaves ovate-ohlong, cordate . . . . . 3. *G. fagifolia*.

Leaves opposite, cordate. Flowers racemose . . . . . 4. *G. oppositifolia*.

1. ***G. antipoda*, Forst.;**—*Fl. N. Z.* i. 161. A rigid bush, erect or prostrate, extremely variable in stature and habit. Branches pubescent, covered with scattered black or yellow-brown bristles. Leaves very coriaceous, veined, shortly petioled, orbicular oblong-lanceolate or linear-lanceolate, acute

obtuse or acuminate,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long in  $\alpha$  and  $\beta$ ,  $\frac{1}{6}$ – $\frac{1}{3}$  in  $\delta$ , serrate, the teeth sometimes ending in a bristle. Flowers small, white or pink, axillary and solitary, or crowded towards the ends of the branchlets, which form leafy racemes; peduncles curved, pubescent. Calyx rarely 6-lobed, lobes red at the tips. Corolla  $\frac{1}{10}$  in. long or more. Capsule with the enlarged calyx  $\frac{1}{2}$  in. diam., purple red or white; sometimes the capsule is itself baccate, and the calyx unchanged, at others neither capsule nor calyx are fleshy.

Var.  $\alpha$ . Erect. Branches pubescent. Leaves broad.

Var.  $\beta$ . Erect. Leaves oblong or lanceolate. Flowers small, almost racemed, on slender, glabrate pedicels.

Var.  $\gamma$ . Depressed or prostrate. Leaves orbicular. Branchlets covered with brown, stiff hairs. Flowers axillary. Fruit very large.—*Fl. Tasman. i. 241. t. 73.*

Var.  $\delta$ . Prostrate, small. Leaves ovate or lanceolate, very small.

Var.  $\epsilon$ . Erect or prostrate. Leaves lanceolate, serrate, with the teeth terminating in bristles.

Throughout the islands, abundant, *Banks and Solander*, etc.; var.  $\beta$ , descending to nearly the level of the sea, as far north as the Bay of Islands; the other varieties more or less alpine. Var.  $\gamma$ , ascending to 5000 ft. Found also on the Tasmanian alps.

2. **G. rupestris**, *Br.*;—*Fl. N. Z. i. 162. t. 42.* A bush or small tree. Branches stout, glabrous or pubescent, sometimes hispid towards the tips. Leaves close-set, alternate,  $\frac{1}{3}$ –1 in. long, from ovate-obtuse to oblong or oblong-lanceolate and acute, crenulate or serrulate, glabrous, extremely coriaceous, reticulate on both surfaces. Racemes short or long,  $\frac{1}{5}$ – $1\frac{1}{2}$  in. long, terminal and axillary, sometimes fastigiate at the ends of the branchlets, few- or many-flowered; pedicels longer or shorter than the bracteoles. Calyx-lobes ovate, acute, often thickening in fruit. Capsule dry.—*Andromeda rupestris*, Forst.

Var.  $\alpha$ . Leaves oblong-lanceolate, acute, serrulate. Branchlets glabrous.

Var.  $\beta$ . Leaves smaller, oblong. Branchlets glabrous.

Var.  $\gamma$ . Leaves as in  $\alpha$ , but more membranous. Branchlets pubescent and setose.

Var.  $\delta$ . Leaves  $\frac{1}{4}$  in. long, nearly orbicular. Branchlets glabrous.—*G. Colensoi*, Hook. f. *Fl. N. Z. i. 162.*

Var.  $\epsilon$ . Leaves oblong, 1 in. long, obtuse. Branchlets hispid, setose at the ends. Calyx baccate. ? A hybrid between *rupestris* and *antipoda*.

**Northern and Middle Islands**: abundant on all the mountains, ascending to 5000 ft., and excessively variable, *Banks and Solander*, etc. Var.  $\epsilon$  is a singular plant; with the habit and baccate calyx of *G. antipoda*, it has the racemose inflorescence of *G. rupestris*; I have it in fruit only, and the locality is doubtful. This species covers large tracts of ground in the lake district of Otago, and the fruit, which is white or red, is eaten by the ground-parrots.

3. **G. fagifolia**, *Hook. f. Fl. N. Z. i. 162.* A shrub, 4–5 ft. high. Branchlets sparingly setulose. Leaves petiolate,  $\frac{3}{4}$  in. long, ovate-oblong, cordate at the base, crenate-serrate, coriaceous, waved. Racemes  $\frac{1}{2}$  in. long. Flowers  $\frac{1}{8}$  in. long. Calyx-lobes ovate-acute, not enlarging after flowering.

**Northern Island**: Motukino, east of Lake Taupo, *Colenso*. I have but two specimens of this most distinct species.

4. **G. oppositifolia**, *Hook. f. Fl. N. Z. i. 162. t. 43.* A large shrub. Branchlets glabrous or setose. Leaves  $1\frac{1}{2}$ – $1\frac{3}{4}$  in. long, sessile, cordate, oblong, obtuse or acute, serrulate or crenate, glabrous or setulose on both surfaces. Racemes axillary and terminal, sometimes panicle (with opposite

branches) at the ends of the branches. Flowers numerous, small, as in *G. rupestris*. Calyx-lobes not becoming fleshy. Capsule small.

**Northern Island:** Mount Egmont, *Bidwill*; cliffs between Hawkes' Bay and Taupo, *Colenso*.

## 2. *PERNETTYA*, Gaud.

Characters of *Gaultheria*, but the calyx is unchanged, or but slightly enlarged after flowering, and the fruit is baccate instead of capsular.

A large South American genus, and there confined to the Andes, Chili and Fuegia.

1. *P. tasmanica*, *Hook. f. Fl. Tasm.* i. t. 73. A very small, creeping, perfectly glabrous plant. Stems slender, 2–3 in. long, without hairs or bristles. Leaves  $\frac{1}{6}$  in. long, sessile, oblong, subacute, subveined, coriaceous, very obscurely crenate. Flowers axillary, solitary, larger than the leaves. Pedicels as long as the leaves, with 3–5 obtuse, imbricate bracts at the base. Corolla campanulate.

**Middle Island:** amongst grass on the Hopkins river, alt. 2500 ft., *Haast*.

This is a most puzzling plant, and seems to unite the genera *Pernettya* and *Gaultheria*, as much as do the varieties of *G. antipoda*, mentioned under that plant. The Tasmanian specimens have no awns to the anther-cells, the New Zealand ones have very short awns: the plants are otherwise undistinguishable. They differ from the small states of *G. antipoda*, with baccate fruit and slightly swollen calyx, only in the minute more obtuse leaves, and total absence of black bristles on the branches; and these latter are so very rare in some states of *G. antipoda*, that I cannot doubt but that all will prove one plant, however anomalous this opinion may appear.

## 3. *CYATHODES*, Br.

Shrubs. Leaves acerose, rigid, pungent or oblong and obtuse, glaucous, parallel-veined below, and not sheathing at the base. Flowers small, white or yellowish.—Pedicels covered with bracts, which become larger upwards, and hide the calyx. Corolla funnel-shaped or urceolate; tube scarcely longer than the calyx, glabrous; lobes glabrous or bearded. Ovary with 3–10 1-ovuled cells. Drupe with a bony 3–10-celled nut.

A large Australian and Pacific island genus.

Leaves $\frac{1}{8}$ – $\frac{1}{2}$ in., very narrow, with rigid, pungent points . . . . .	1. <i>C. acerosa</i> .
Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in., narrow, linear-oblong, subacute . . . . .	2. <i>C. robusta</i> .
Leaves $\frac{1}{8}$ – $\frac{1}{6}$ in., narrow, linear, patent or recurved, obtuse . . . . .	3. <i>C. empetrifolia</i> .
Leaves $\frac{1}{8}$ – $\frac{1}{6}$ in., linear or oblong, suberect, obtuse. Corolla bearded . . . . .	4. <i>C. Colensoi</i> .

1. *C. acerosa*, *Br.*;—*Fl. N. Z.* i. 163. A large shrub or small tree, with blackish branches. Leaves spreading, about  $\frac{1}{6}$ – $\frac{1}{2}$  in. long, acerose or very narrow linear or lanceolate, pungent, margins often recurved and ciliate, under side glaucous, with 3–7 parallel veins, of which the outer often branch outwards. Flowers solitary, minute. Bracts and calyx-lobes obtuse. Corolla glabrous; lobes spreading. Drupe red,  $\frac{1}{8}$ – $\frac{1}{2}$  in. diam.

Var.  $\alpha$ . Leaves usually only  $\frac{1}{4}$  in. long, linear, lateral nerves often branching outwards.—*C. acerosa*, *Br.*

Var.  $\beta$ . Leaves often  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, with longer pungent points, nerves all simple.—*C. oxycedrus*, *Br.*;—*Fl. N. Z.* i. 164.

Abundant throughout the islands, *Banks* and *Solander*, etc.; ascending the mountains in a stunted form. The same branch bears minute, dry, and large succulent drupes. Both varieties are common New Zealand plants.



2. **C. robusta**, Hook. f., n. sp.—*C. acerosa*,  $\beta$ , *latifolia*, Fl. N. Z. i. 163. A much larger and more robust plant than *C. acerosa*. Leaves spreading,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long, narrow linear-oblong,  $\frac{1}{8}$  in. broad, subacute, not pungent, 5–11-nerved below, the outer nerves sometimes branching outward.

**Chatham Island**, Dieffenbach and Herb. Mueller. I was at first disposed to refer this to a form of *C. acerosa*, but more specimens, received from Dr. Mueller, quite agreeing with Dieffenbach's, and equally without the pungent tips to the leaves, seem to indicate its specific distinctness. I have seen no flowers; the drupe is  $\frac{1}{8}$  in. diam.

3. **C. empetrifolia**, Hook. f. Fl. N. Z. i. 164. A small, procumbent, alpine, straggling plant, with slender, leafy, tomentose branches, 8–24 in. long. Leaves erect, spreading or recurved,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, linear, obtuse, glabrous, pilose or pubescent, convex above, glaucous below; margins recurved, ciliated; midrib stout; veins 0. Flowers minute, axillary or terminal, solitary or 2 or 3 together. Peduncle very short. Corolla-tube not longer than the calyx; lobes glabrous, acute. Drupe 3–5-celled.—*Androstoma empetrifolia*, Fl. Antart. i. 44. t. 30.

Common on the mountains of the **Northern** and **Middle** Islands, and of **Lord Auckland's** group and **Campbell's** Island.

4. **C. Colensoi**, Hook. f.—*Leucopogon Colensoi*, Fl. N. Z. i. 165. Stems robust, prostrate, with erect or ascending, puberulous, leafy branches, 4–10 in. high. Leaves erect or suberect,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, linear-oblong or obovate-oblong, obtuse, glabrous, convex above, glaucous below, with 3 stout nerves, the outer branching towards the margin; margins thin, cartilaginous or membranous, especially towards the tips. Flowers in short 3–5-flowered racemes. Corolla-lobes bearded. Drupe white or red, 5-celled.

**Northern** Island: base of Tongariro, Lake Taupo, Ruahine range, etc., *Colenso*. **Middle** Island: Gordon's Nob and Fairfield Downs, *Munro*; Wairau mountains, alt. 4–5500 ft., *Travers*; Common on the Southern Alps, *Haast*; Otago, lake district, alt. 2000 ft., *Hector* and *Buchanan*. Intermediate between *Cyathodes* and *Leucopogon* in characters, but with the habit of the former genus, to which I have referred it, both on this account and because of its extremely close affinity with *C. Tamaiameia*, Cham., of the Sandwich Islands; it is also most closely allied to *Leucopogon suaveolens* of the Bornco alps, which may be a *Cyathodes*.

#### 4. LEUCOPOGON, Br.

Shrubs, sometimes very small, or trees. Leaves imbricating or scattered, coriaceous, parallel-veined below, not sheathing at the base. Flowers solitary spiked or racemose, white or pink.—Pedicels with 2 or 3 bracts below the calyx. Corolla tubular, campanulate or funnel-shaped; lobes spreading, bearded. Ovary with 2–10 1-ovuled cells. Drupe with a bony 1–10-celled nut.

Chiefly an Australian genus, but also found on the mountains of the Malayan and Pacific Islands.

Leaves subwhorled, spreading. Flowers minute, spiked . . . . . 1. *L. fasciculatus*.  
Leaves imbricate, with long pungent tips. Flowers solitary, large . . . . . 2. *L. Frazeri*.

1. **L. fasciculatus**, A. Rich.;—Fl. N. Z. i. 164. A large shrub or small tree, with slender, spreading, puberulous branchlets. Leaves somewhat whorled, patent,  $\frac{1}{3}$ –1 in. long, linear-lanceolate or oblong, obtuse or acuminate, flat, glabrous, striated above, glaucous and obscurely veined below; margins denticulate or ciliolate. Flowers minute, on drooping, filiform, fascicled

spikes, crowded or distant, greenish; bracts and calyx-lobes obtuse. Drupe small, hard, fleshy, oblong, 2-celled.—*Epacris fasciculatus*, Forst.

Var.  $\alpha$ . Leaves linear-lanceolate, acute or acuminate.

Var.  $\beta$ . Leaves broader, oblong, hardly acute.—*L. brevilabris*, Stsch., in Bull. Soc. Nat. Hist. Mosc. xxxii.

Abundant throughout the islands, *Banks and Solander*, etc. Var.  $\beta$ , in mountainous districts.

2. **L. Frazeri**, *A. Cunn.*;—*Fl. N. Z.* i. 165. A very small, erect or ascending plant, 2–4, rarely 6–8 in. high, branches often curving, densely covered with imbricating leaves. Leaves close-set,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, obovate-oblong or linear-oblong, with long, pungent, mucronate tips, glabrous above, margins flat or recurved, serrulate, cartilaginous, glaucous below, the nerves branching outwards. Flowers solitary, axillary, sessile, large; bracts short, broad. Calyx-lobes lanceolate, twice as long as the bracts. Corolla tubular,  $\frac{1}{2}$  in. long; lobes short. Drupe 1- or more celled.—*L. nesophilus*, DC. Prodr. vii. 752; *L. Bellignianus*, Raoul, Choix, 18. t. 12.

Abundant throughout the islands in dry soil, ascending to 5000 ft., *Banks and Solander*, etc. The sweetish orange drupe is edible. Also found on the Tasmanian and Victorian alps, and very closely allied to a Borneau species.

## 5. PENTACHONDRA, Br.

Small, alpine, procumbent, straggling or caespitose plants. Leaves imbricating.—Flowers solitary, axillary, sessile. Bracts 4 or more. Corolla tubular or funnel-shaped; lobes spreading, densely bearded within. Drupe with 5 or more small 1-seeded nuts.

A small genus, natives of the alps of Australia, Tasmania, and New Zealand.

1. **P. pumila**, *Br.*;—*Fl. N. Z.* i. 166. Stems woody, procumbent, with numerous, short, ascending, tufted, leafy branches, 1–4 in. high. Leaves close-set, suberect, imbricating,  $\frac{1}{3}$  in. long, oblong, obtuse, concave, margins ciliate, glossy on both surfaces, glabrous or ciliated, striated, 3–5-nerved. Flowers twice as large as the leaves. Bracts and calyx-lobes short, ciliated. Corolla tubular; lobes 5, short, densely bearded. Berry large, often  $\frac{1}{2}$  in. long, red, succulent. Nuts 5 or more, small, almost reniform.—*Epacris pumila*, Forst. Prodr.

**Northern** and **Middle** Islands: abundant on the mountains, *Forster*; ascending to 5500 ft. in the Nelson ranges. Also found on the Victorian and Tasmanian alps.

## 6. EPACRIS, Smith.

Shrubs, often small, or small trees. Leaves shortly petioled, usually closely imbricating, rarely sheathing at the base.—Flowers solitary, shortly peduncled; bracts numerous, imbricating, covering the peduncle and concealing the base of the calyx. Corolla tubular or bell-shaped; limb not bearded. Capsule dry, 5-celled, 5-valved; cells with numerous seeds attached to a central placenta.

A very large Australian and Tasmanian genus, found also in New Zealand, but nowhere else.

- |  |                             |
|--|-----------------------------|
| Leaves with long, pungent points . . . . .                       | 1. <i>E. purpurascens</i> . |
| Leaves not pungent, acuminate. Bracts and sepals acute . . . . . | 2. <i>E. pauciflora</i> .   |
| Leaves obtuse. Bracts and sepals acute . . . . .                 | 3. <i>E. Sinclairii</i> .   |
| Leaves ovate obtuse. Bracts and sepals obtuse . . . . .          | 4. <i>E. alpina</i> .       |

1. **E. purpurascens**, Br. An erect, tall, sparingly-branched shrub, 6 ft. high; branches flexuose,  $\frac{1}{2}$ –1 ft. long, densely clothed throughout with closely imbricating, sheathing, spreading, recurved, pungent leaves. Leaves  $\frac{1}{2}$  in. long, coriaceous, very convex, sheathing by their lower part, but attached by a small broad petiole, broadly ovate-cordate, suddenly contracting into the rigid patent needle-like tip, quite glabrous. Flowers very numerous, often one in the axil of every leaf for a large portion of the branches; bracts and sepals ovate-lanceolate, acuminate, pungent. Corolla  $\frac{1}{4}$  in. long; lobes ovate, acute.—*E. pungens*, Bot. Mag. t. 844.

**Northern Island**: Papakura, 18 miles from Auckland, *Sinclair*. A New South Wales plant, and I cannot but suspect introduced (like *Stylidium graminifolium*) into New Zealand, but Dr. Sinclair, with whom I had a good deal of correspondence on the subject, regarded it as indigenous.

2. **E. pauciflora**, A. Rich.;—*Fl. N. Z.* i. 166. A glabrous, erect, twiggy shrub, 1–2 ft. high, branches puberulous, stoutish, leafy. Leaves very coriaceous, suberect, imbricating,  $\frac{1}{8}$ – $\frac{1}{5}$  in. long, concave, broadly ovate or oblong-lanceolate, suddenly acuminate, obtuse at the tip, nerveless, quite smooth and glabrous on both surfaces. Flowers small, white, scarcely longer than the leaves, numerous towards the tips of the branches; bracts very numerous, ovate, acute, closely imbricating in 5 or 6 ranks. Corolla with a very short tube, and patent, broad, rounded lobes. Capsule small.

**Northern and Middle Islands**: on dry hills and in swampy grounds, *Banks and Solander*, etc. Common as far south as Nelson, very near the Tasmanian *E. virgata*.

3. **E. Sinclairii**, Hook. f., n. sp. A foot high, much branched; branches stout, puberulous, leafy. Leaves erect, imbricating,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, densely coriaceous, narrow lanceolate-oblong or oblong, obtuse, smooth and glabrous on both surfaces. Bracts, calyx, etc., as in *E. pauciflora*.

**Northern Island**, *Herb. Sinclair*. Numerous fine specimens of this are in Sinclair's Herbarium, but without ticket; it resembles *E. pauciflora*, but is a much less twiggy and more branched plant, with narrower, less concave not acuminate leaves.

4. **E. alpina**, Hook. f. *Fl. N. Z.* i. 167. A small, alpine, tufted or straggling shrub, 6–10 in. high, much branched, erect or decumbent; branches puberulous. Leaves spreading or suberect, very coriaceous,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, broadly ovate, obtuse, glabrous and smooth on both surfaces. Flowers axillary towards the ends of the branches; bracts and calyx-lobes broadly ovate, obtuse. Corolla not seen.

**Northern Island**: base of Tongariro and Lake Taupo, *Bidwill, Colenso*. **Middle Island**: Southern Alps, growing with *Pentachondra*, *Sinclair* and *Haast*. A smaller and more straggling plant than either of the preceding, with obtuse bracts and calyx-lobes; very closely allied to the Tasmanian *E. serpyllifolia*, but the flowers are different, and leaves not mucronulate.

## 7. ARCHERIA, Hook. f.

Branched shrubs, with coriaceous, evergreen leaves. Flowers in the New Zealand species in terminal racemes. Bracts few or 0. Corolla as in *Epacris*. Capsule deeply 5-lobed. Seeds ascending from basilar or subbasilar placentæ.

This genus was established in the Tasmanian Flora, for a set of peculiar *Epacrideæ*, differing from *Epacris* in the absence of bracts, the usually more deeply lobed ovary, with

basilar placentas, and was divided into two sections, one with axillary flowers and long styles, the other (to which the New Zealand species belong) with racemed flowers and short styles.

Leaves  $\frac{1}{3}$ – $\frac{1}{2}$  in., narrow linear or linear-lanceolate . . . . . 1. *E. Traversii*.  
Leaves 1 in., broadly obovate or oblong . . . . . 2. *E. racemosa*.

1. **A. Traversii**, *Hook. f., n. sp.* A small (?) shrub with slender spreading branches. Leaves loosely set, very spreading,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, narrow linear-lanceolate, acute, quite glabrous, smooth and shining on both surfaces, margin recurved, midrib very thick below. Flowers small, in very short, terminal, puberulous racemes. Bracts few, deciduous, oblong, obtuse. Sepals oblong; margins membranous. Corolla not seen. Capsule minute.

**Middle Island:** woods, Aorere valley, alt. 1400 ft., "not observed on the Nelson side of the valley," *Travers*.

2. **A. racemosa**, *Hook. f.;—Epacris racemosa*, Fl. N. Z. i. 167. A shrub. Branches very slender. Leaves scattered in fascicles or almost whorled, very spreading, 1 in. long,  $\frac{1}{3}$  broad, elliptic- or obovate-oblong, acute, flat, nerveless. Raceme  $\frac{1}{2}$  in. long, downy; bracts and calyx-lobes oblong; margins membranous. Corolla  $\frac{1}{6}$  in. diam.; tube short, broad; lobes broad, ovate, obtuse.

**Great Barrier Island, Rough.**

## 8. DRACOPHYLLUM, Lab.

Shrubs or trees, sometimes prostrate or tufted. Leaves long, rigid or grassy, usually crowded at the ends of the branchlets, their bases broad, sheathing, suddenly contracting into a long subulate, usually concave, very narrow blade, which tapers from the base to the tip.—Flowers in axillary or terminal branched panicles racemes or spikes, rarely solitary; pedicel bracteate. Sepals 5, ovate or lanceolate, persistent, longer or shorter than the corolla. Corolla tubular or campanulate, usually white; lobes 5, spreading, ovate or lanceolate, obtuse, their tips more or less inflexed. Anthers 5, sessile at the mouth of the corolla. Disk of 5 erect scales. Ovary 5- or 6-celled; style shortish, stout; ovules numerous in each cell, attached to a pendulous placenta. Capsule shorter than the sepals, 5- or 6-celled, 5- or 6-valved.

A large genus in New Zealand, having several representatives in Tasmania, temperate Australia and New Caledonia.

### 1. *Leaves patent or recurved (or suberect in 3). Flowers panicle or spiked.*

Flowers in terminal panicles, 8–16 in. long. Corolla  $\frac{1}{2}$  in. . . . . 1. *D. latifolium*.  
Flowers in lateral panicles, 3–6 in. long. Corolla  $\frac{1}{4}$  in. . . . . 2. *D. Menziesii*.  
Flowers in terminal panicles, 2–4 in. long. Corolla  $\frac{1}{8}$  in. . . . . 3. *D. strictum*.  
Flowers few, spiked. Leaves 2–5 in., pungent . . . . . 4. *D. squarrosus*.  
Flowers in capitate spikes. Leaves  $\frac{2}{3}$ –1 in., obtuse . . . . . 5. *D. recurvum*.

### 2. *Leaves erect, with acicular or pungent tips. Flowers spiked (solitary in 9).*

Leaves 4–9 in., pubescent or glabrate. Sheath  $\frac{1}{2}$ – $\frac{1}{2}$  in. broad . . . . . 6. *D. longifolium*.  
Leaves 1–4 in., glabrous. Sheath  $\frac{1}{8}$ – $\frac{1}{8}$  in. broad . . . . . 7. *D. Urvilleanum*.  
Leaves  $\frac{1}{4}$ – $\frac{3}{4}$  in., glabrous or puberulous. Flowers 2 or 3 . . . . . 8. *D. subulatum*.  
Leaves  $\frac{1}{2}$ – $\frac{2}{3}$  in., glabrous or puberulous. Flower solitary . . . . . 9. *D. uniflorum*.

### 3. *Leaves erect, not pungent, obtuse at the very tip. Flowers solitary or 2- or 3-spiked.*

Leaves  $\frac{1}{6}$ –1 in. Flowers lateral . . . . . 10. *D. rosmarinifolium*.  
Leaves  $\frac{1}{10}$  in. Flower solitary, terminal . . . . . 11. *D. muscoides*.



1. **D. latifolium**, *A. Cunn.*;—*Fl. N. Z.* i. 167. A small tree, 8–15 ft. high. Bark black. Leaves spreading and squarrose, 10–24 in. long,  $1\frac{1}{2}$  broad at the base, serrulate, gradually tapering into very long, fine points, very concave, rarely nearly flat. Panicle terminal, very large and dense, 8–16 in. long, narrow oblong, cernuous in fruit; rachis and branches stout, pubescent. Flowers innumerable, densely crowded,  $\frac{1}{3}$  in. long. Sepals broadly ovate, obtuse, a quarter the length of the shortly campanulate corolla. Style short, stout. Capsule  $\frac{1}{8}$ – $\frac{1}{6}$  in. diam.

**Northern** Island: common in woods from the Bay of Islands to Auckland, *Banks and Solander*, etc.

2. **D. Menziesii**, *Hook. f. Fl. N. Z.* i. 168. A small tree. Leaves similar to those of *D. latifolium*, but less serrulate, only 6–8 in. long, and  $\frac{3}{4}$  broad at the base. Panicle lateral, 3–6 in. long, pubescent, cernuous in fruit, sparingly branched, not very many-flowered. Flowers on curved peduncles,  $\frac{1}{4}$  in. long. Sepals broadly ovate, acute,  $\frac{1}{4}$  shorter than corolla. Style long and stout. Capsule nearly  $\frac{1}{4}$  in. diam.

**Middle** Island. Dusky Bay, *Menzies*; Port Preservation, *Lyall*; Otago, lake district, *Hector and Buchanan*.

3. **D. strictum**, *Hook. f. Fl. N. Z.* i. 168. A small (?) shrub. Leaves strict, patent or suberect, sword-shaped, flattish,  $1\frac{1}{2}$ –3 in. long,  $\frac{1}{6}$ – $\frac{1}{8}$  in. broad at the sheathing base; margin scarcely serrulate. Panicle terminal, 2–4 in. long, puberulous. Flowers rather numerous,  $\frac{1}{6}$  in. long. Sepals broadly ovate, subacute,  $\frac{1}{3}$  as long as the corolla. Style short, stout. Capsule  $\frac{1}{10}$  in. diam.

Var. *a*. Larger. Leaves suberect, 2–3 in. long,  $\frac{1}{3}$  broad at the base.

Var. *β*. Smaller. Leaves patent, 2 in. long,  $\frac{1}{4}$  broad at the base.—*D. affine*, *Hook. f. Fl. N. Z.* i. 168.

**Northern** Island. Var. *a*, Tongariro, *Bidwill*; var. *β*, *Dieffenbach*. **Middle** Island: Otago, lake district, *Hector and Buchanan*; var. *β*, Southern Alps, *Sinclair and Haast*.

4. **D. squarrosus**, *Hook. f. Fl. N. Z.* i. 169. A shrub, with branchlets as thick as a crow-quill. Leaves patent and recurved, 2–5 in. long,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad at the sheathing base, which is not auricled, and gradually attenuated, rather soft and grass-like, margins of young leaves serrulate, ciliate towards the base. Flowers,  $\frac{1}{4}$  in. long, in short, simple, 3–5-flowered, spiciform racemes  $\frac{1}{2}$ –1 in. long. Sepals equalling the tube of the corolla, ovate-lanceolate, acuminate, ciliate; corolla-lobes ovate-lanceolate. Style rather long.

**Northern** Island: east coast, *Banks and Solander*; Auckland, *Sinclair*; Manakau Bay, *Colenso*.

5. **D. recurvum**, *Hook. f. Fl. N. Z.* i. 171. A small, erect, much branched shrub, 1 ft. or more high. Leaves much recurved,  $\frac{2}{3}$ –1 in. long, sheathing base membranous,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad, suddenly contracted into a rigid, concave, subulate, recurved lamina,  $\frac{1}{10}$  in. broad at the base, obtuse at the very tip, minutely serrulate, almost keeled at the back. Flowers  $\frac{1}{4}$  in. long, in terminal, oblong, bracteate spikes  $\frac{1}{2}$  in. long; bracts foliaceous, almost hiding the flowers. Sepals ovate-lanceolate, acute, as long as the corolla-tube. Corolla-lobes ovate, acute. Capsules small, shorter than the sepals.

**Northern** Island: Tongariro, *Bidwill*; Mount Hikurangi and tops of the Ruahine range, *Colenso*. Probably a recurved-leaved form of *D. rosmarinifolium*, but it looks very different in the foliage and dense heads of flowers.

6. **D. longifolium**, Br.;—*Fl. N. Z.* i. 169, and *D. Lyallii*, Hook. f. l. c. A small tree, with black bark. Leaves erect, 3–9 in. long, sheath  $\frac{1}{2}$  in. broad, lamina at the base  $\frac{1}{5}$ – $\frac{1}{3}$  in. broad, concave, rigid, pubescent above, rarely glabrous, ciliate at the margins. Racemes lateral, 1–1 $\frac{1}{2}$  in. long, 6–12-flowered. Flowers crowded,  $\frac{1}{4}$  in. long. Sepals broadly ovate, acute, ciliated, longer than the corolla-tube.—*Epacris longifolia*, Forst.

**Middle Island**: Dusky Bay, *Forster*; Thomson's Sound, *Lyall*; Otago, *Lindsay*; Dunedin, ascending to 3000 ft., *Hector and Buchanan*; Southern Alps, above the *Fagus* forest, alt. 3–4000 ft., *Haast*; Hopkins river, 4000 ft., *Haast* (leaves 2–3 in. long). **Lord Auckland's** group and **Campbell's** Island: abundant near the sea, *J. D. H.* The Campbell's Island specimens have more obtuse sepals and shorter leaves (2–3 in. long). Mr. Buchanan observes that the wood is soft, makes pretty veneers, and burns well when new-cut. None of the Middle Island specimens are so large in the foliage as the Auckland Island, which also are most pubescent. The *D. Lyallii* I find to be connected by too many intermediate forms to rank as a separate variety.

7. **D. Urvilleanum**, *A. Rich.*;—*Fl. N. Z.* i. 170. A much branched shrub, 6–8 ft. high. Branches slender, quite black or dark chestnut. Leaves erect, very slender, flexuous, 1–4 in. long; sheath membranous,  $\frac{1}{5}$ – $\frac{1}{8}$  in. broad, auricled, lamina  $\frac{1}{20}$  in. broad at the base, concave, glabrous, not serrulate. Racemes short, lateral, 6–10-flowered. Flowers small,  $\frac{1}{8}$  in. long. Sepals ovate-acuminate, equalling the corolla-tube, ciliate or glabrous.

Var.  $\alpha$ . Leaves 1 $\frac{1}{2}$ –2 in. long.

Var.  $\beta$ . Branches paler. Leaves 2–4 in. long, more flexuose.—*D. filifolium*, Hook. f. *Fl. N. Z.* i. 169; *D. setifolium*, Stsch., in *Bull. Soc. Nat. Hist. Mosc.* xxxii. 23.

Var.  $\gamma$ . Branches chestnut-brown. Leaves 1–1 $\frac{1}{2}$  in. long. Sepals ovate-lanceolate, exceeding the corolla.—*D. Lessonianum*, *A. Rich.*—*Fl. N. Z.* i. 171.

Var.  $\delta$ . More robust. Branches chestnut-brown. Leaves 1–1 $\frac{1}{2}$  in. long, often ciliate or tomentose on the edges. Sepals ovate, acute, fimbriate, rather shorter than the corolla.—*D. scoparium*, Hook. f. *Fl. Ant.* 47. t. 33; —*Fl. N. Z.* i. 171.

**Northern Island**: var.  $\alpha$ , Tasman's Bay, *D'Urville*; Bay of Islands, banks of the Keri-Keri river, *A. Cunningham*, etc.; var.  $\beta$ , various places from Auckland to Wellington, *Colenso*, etc.; var.  $\gamma$ , Bay of Islands to Auckland not unfrequent, on dry hills; var.  $\delta$ , mountainous districts of the **Northern** Island: top of Ruahine mountains, *Colenso*. **Middle Island**: ascending to 4000 ft. in Nelson, *Travers*; Southern Alps, *Sinclair and Haast*. **Chatham** Island, *Dieffenbach* (edges of leaves very downy). **Campbell's** Island: common near the sea, *J. D. H.*

8. **D. subulatum**, Hook. f. *Fl. N. Z.* i. 171. An erect shrub, 2–4 ft. high, with slender, sparingly leafy branches, and red-brown bark. Leaves erect, rigid, pungent,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, strict or flexuose, sheath  $\frac{1}{2}$  in. broad, blade  $\frac{1}{3}$  in. broad at the base, semiterete, concave, puberulous or glabrate above, margin most minutely ciliate. Racemes small, lateral, 2–5-flowered. Flowers small,  $\frac{1}{10}$ – $\frac{1}{8}$  in. long. Sepals broadly ovate, subacute, as long as the short tube of the corolla, quite glabrous.

**Northern** Island: barren plains of Tawahiti, base of Tongariro, Tarawera, etc., *Colenso*. A very distinct little species, and quite different from any form of *D. Urvilleanum*.

9. **D. uniflorum**, Hook. f., *n. sp.* A stout, erect shrub, with dark red-brown bark. Leaves erect, rigid, coriaceous, pungent,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long, sheath  $\frac{1}{10}$ – $\frac{1}{8}$  in. broad, not auricled; blade  $\frac{1}{5}$ – $\frac{1}{20}$  in. broad at the base, semiterete, concave and puberulous above, margin most minutely ciliate. Flower solitary, lateral, almost hidden by sheathing bracts,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long. Sepals lanceolate, acute, as long as the corolla-tube.

**Middle Island**; Wairau mountains, alt. 4000 ft., *Travers*; Rangitata range, 3-5000 ft., *Sinclair and Haast*; forming much of the subalpine vegetation between 3000 and 5000 ft. in the Southern Alps, *Haast*; Otago, lake district, alpine, *Hector and Buchanan*. A very distinct species, remarkable for the short, pungent leaves, and large solitary flower.

10. ***D. rosmarinifolium*, Forst.**;—*Fl. N. Z. i.* 171. A very small, often prostrate, woody shrub, a few inches to 1 ft. high. Leaves erect or somewhat recurved,  $\frac{1}{6}$ -1 in. long, rigid, straight or curved; sheath  $\frac{1}{8}$ - $\frac{1}{6}$  in. broad; blade  $\frac{1}{2}$  in. broad at the base, semiterete, concave, minutely ciliate, keeled towards the obtuse tip. Flowers solitary or in 2-flowered spikes,  $\frac{1}{8}$ - $\frac{1}{6}$  in. long. Sepals ovate, subacute, glabrous, as long as the corolla-tube.

**Middle Island**: Dusky Bay, *Forster, Lyall*; Nelson mountains, *Bidwill*; Wairau mountains, altitude 4-5000 ft., *Travers*; Otago alps, altitude 5-7000 ft., *Hector and Buchanan*; common in the Southern Alps, ascending to 6300 ft., *Sinclair and Haast*. Allied to *D. subulatum*, but the obtuse leaves at once distinguish it; nearer *D. recurva*.

11. ***D. muscoides*, Hook. f., n. sp.** A most densely tufted little species, with woody subterranean stem, and compacted, short branches, densely covered with minute, imbricate leaves. Leaves  $\frac{1}{10}$  in. long, ovate-subulate from a broad sheathing base, obtuse, coriaceous, semiterete, shining, most minutely ciliate. Flower solitary, terminal,  $\frac{1}{8}$  in. long. Sepals ovate, subacute, as long as the corolla-tube.

**Middle Island**: alps of Otago, alt. 7-8000 ft., *Hector and Buchanan*. A very singular little plant, closely allied to the *D. minimum*, F. Muell., of the Victorian alps, but differing in the longer branches, covered with shorter, more imbricating leaves.

## ORDER XLIII. MYRSINÆ.

Shrubs or trees. Leaves alternate, simple, exstipulate, full of pellucid glandular dots or lines. Flowers small, regular, or nearly so.—Calyx inferior in the New Zealand genus, 4- or 5-cleft, imbricate. Corolla, 4- or 5-cleft or 5-partite, rarely of 5 free petals. Stamens 4 or 5, opposite to and inserted on the corolla-lobes, or almost free. Ovary 1-celled; style simple, stigma simple or lobed; ovules 1 or more, inserted on a free central, often fleshy placenta. Berry indehiscent, 1-celled, 1-many-seeded. Seeds sometimes enclosed within the withered placentas, albuminous; embryo transverse, terete.

A tropical and subtropical Order, advancing much further south in the New Zealand Islands than in any other longitude.

### 1. MYRSINÆ, Linn.

(*Suttonia*, *Fl. N. Z.*)

Trees and shrubs, sometimes small and creeping. Flowers small, usually in lateral fascicles or umbellate, rarely axillary and solitary, hermaphrodite or polygamous.—Calyx 4- or 5-fid, inferior, rarely 2-fid or 0. Petals 4 or 5, free or tapering at the base, reflexed, deciduous. Stamens 4 or 5; filaments free or attached to the base of the petals. Ovary subglobose, 1-celled; style short or 0; stigma concave or fimbriate; ovules 1-5, sunk in the fleshy placenta. Fruit a berry or drupe with a crustaceous nut. Seeds solitary or few, usually enclosed in the papery remains of the placenta.

A large genus, found in all tropical and warm countries, rare in temperate.

- Tree. Leaves 4-6 in., linear, glands oblong . . . . . 1. *M. salicina*.  
 Shrub, erect. Leaves 1-1½ in., oblong or obovate . . . . . 2. *M. Urvillei*.  
 Shrub, erect. Leaves ½ in., obovate or obcordate, retuse or 2-lobed . . . 3. *M. divaricata*.  
 Tree. Leaves ½-1 in., oblong-obovate, obtuse; cuticle loose below . . 4. *M. montana*.  
 Small, trailing shrub. Leaves ¼-½ in., orbicular or obovate . . . . . 5. *M. nummularia*.

1. ***M. salicina***, *Heward, mss.*—*Suttonia*, Fl. N. Z. i. 172. t. 44. A small, erect, perfectly glabrous tree. Leaves 4-6 in. long,  $\frac{1}{2}$ - $\frac{2}{3}$  broad, narrow linear or linear-oblong, obtuse, quite entire, flat, much veined, pellucid glands oblong. Flowers in dense lateral many-flowered fascicles, hermaphrodite,  $\frac{1}{12}$  in. broad; pedicels  $\frac{1}{4}$  in. long, stout. Calyx oblique; lobes rounded, ciliate. Petals cohering at the base. Stamens adhering to the petals. Berry ovoid,  $\frac{1}{4}$  in. long, 2-seeded.

**Northern Island**: in woods, from Bay of Islands to Wellington, *Cunningham, Colenso*, etc.

2. ***M. Urvillei***, *A. DC.*—*Suttonia australis*, A. Rich. Flor. t. 38;—Fl. N. Z. i. 173. A shrub, 8-10 ft. high, perfectly glabrous; bark nearly black. Leaves 1-1½ in. long, oblong or obovate, obtuse, coriaceous, undulate, much veined, studded with rounded pellucid glands. Flowers in capitate, lateral fascicles,  $\frac{1}{16}$  in. broad. Calyx 0 or 2-4-lobed. Petals revolute. Stamens adherent to the petals; anthers large; stigma sessile, capitate. Berries small, globose,  $\frac{1}{8}$ - $\frac{1}{6}$  in. diam.—*M. Richardiana*, Endl.

**Northern and Middle Islands**, abundant, *Banks and Solander*, etc. Resembles *Pittosporum undulatum* a good deal in foliage.

3. ***M. divaricata***, *A. Cunn.*—*Suttonia*, Fl. N. Z. i. 173; Fl. Antaret. i. 51. t. 34. A small, very straggling, twiggy, branched bush. Leaves alternate or fascicled,  $\frac{1}{3}$  in. long, broadly obovate or obcordate, obtuse retuse or 2-lobed, very coriaceous, reticulated, pellucid glands rounded. Flowers minute,  $\frac{1}{12}$  in. diam., fascicled. Calyx 4- or 5-lobed. Petals 4 or 5, obovate. Style short; stigma cup-shaped, lacerate. Berry small, depressed, spherical.

**Northern Island**: moist woods, abundant, **Lord Auckland's** group, *J. D. H.* Habit of a *Coprosma*.

4. ***M. montana***, *Hook. f.*—*Suttonia*, Fl. N. Z. ii. 334. A small tree, branches robust; bark dark red-brown. Leaves alternate,  $\frac{1}{2}$ -1 in. long, oblong-obovate, obtuse, very coriaceous, reticulate above, cuticle beneath loose when dry, pellucid glands rounded. Flowers not seen. Fruit globose.

**Northern Island**: top of the Ruabine range, *Colenso*. Possibly only a variety of *M. divaricata*, as I originally supposed, but the habit is very different, branches more robust, leaves longer and more coriaceous, not fascicled, reticulate above only, and never obcordate or 2-lobed.

5. ***M. nummularia***, *Hook. f.*—*Suttonia*, Fl. N. Z. i. 173. t. 45. A small prostrate shrub, with very slender branches, straggling, 6-18 in. long. Leaves alternate,  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, orbicular or broadly obovate, reticulate above, wrinkled below, pellucid glands rounded. Flowers minute, scattered, solitary, axillary or lateral. Calyx very minute, 4-lobed. Petals 4, concave, ciliate. Stamens large, inserted on the petals. Stigma sessile, conical. Berry globose,  $\frac{1}{10}$  in. diam.

**Northern Island**: not uncommon on the mountains; top of the Ruabine range, Lake Rotoatara, etc., *Colenso*. **Middle Island**: alps near Haast's Pass, *Haast*; Otago, lake district, scrambling over rocks, *Hector and Buchanan*.



## ORDER XLIV. PRIMULACEÆ.

Characters of *Myrsineæ*, but plants herbaceous, leaves less coriaceous, without pellucid glands, and corolla usually less deeply divided.

A large Order in the northern hemisphere, especially in the cold, temperate, and mountainous regions, rare in the tropics, and still more so in the southern hemisphere.

## 1. SAMOLUS, Linn.

Creeping, rarely erect herbs. Leaves alternate. Flowers axillary and solitary in the New Zealand species.—Calyx half-superior, persistent, 5-cleft. Corolla campanulate, tube very short, 5-cleft. Stamens 5, inserted on the corolla, alternating with 5 staminodia. Ovary subglobose; style straight, stigma capitate: ovules numerous. Capsule half-inferior, 5-valved at the top, 1-celled, many-seeded.

A genus found in Europe, and in various temperate and subtropical parts of the world.

1. *S. littoralis*, Br.;—*Fl. N. Z.* i. 207. A small prostrate and creeping, branched, perfectly glabrous herb. Leaves fleshy,  $\frac{1}{6}$ –1 in. long, linear-spathulate or oblong-spathulate, often recurved. Peduncles longer than the leaves. Flowers white,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam. Capsule crowned with the persistent stigma.—*Sheffieldia repens*, Forst.

Marshy places near the sea throughout the islands, *Banks and Solander*, etc. Also abundant in Australia, Tasmania, the Pacific Islands, and found in South Chili.

*Anagallis arvensis*, Linn., the “Scarlet Pimpernel” or “Poor Man’s Weather-glass,” has been introduced into cultivation.

## ORDER XLV. SAPOTEÆ.

Trees or shrubs, juice usually milky. Leaves alternate, entire, exstipulate, coriaceous. Flowers axillary, regular, solitary or fascicled.—Calyx free, 4–8-toothed or -partite. Corolla 4–8-lobed; lobes imbricate. Stamens 4–8 or 8–16, sometimes with alternating staminodia. Ovary superior, 2–12-celled; style simple, stigma simple or lobed; ovules solitary in each cell. Fruit a berry or drupe, 1–4-seeded. Seeds usually with a crustaceous, shining testa, marked with a large unpolished hilum, albuminous with foliaceous cotyledons or exalbuminous with fleshy cotyledons.

Almost exclusively a tropical Order, found in both the Old and New World.

## 1. SAPOTA, Linn.

Trees, with milky juice. Leaves generally fascicled at the ends of the branches. Flowers polygamous, in axillary or lateral fascicles or umbels.—Sepals 4–6, orbicular, imbricate. Corolla 4–6-lobed. Stamens 4–6, short, inserted at the base of the corolla-lobes and opposite them, alternating with as many staminodia. Ovary hirsute, 4–12-celled; style straight, stigma simple. Berry with 1 nut-like seed. Seeds elongate, compressed; testa hard, crustaceous, shining, with a long grooved opaque hilum; embryo with flat foliaceous cotyledons and a short terete radicle.

A small genus of chiefly tropical trees.

1. **S. costata**, *A. DC.*;—*Fl. N. Z.* i. 174. A tree, 20 ft. high, branches hoary. Leaves 2–3 in. long, coriaceous, obovate-oblong, obtuse, with numerous parallel veins diverging from the midrib. Pedicels stout, curved,  $\frac{1}{4}$  in. long. Flowers globose,  $\frac{1}{8}$  in. diam., usually 4-merous. Sepals very coriaceous. Corolla-lobes scarcely longer than the sepals. Filaments short, fleshy. Ovules suspended. Berry  $\frac{3}{8}$ –1 in. long.

**Northern Island**: Wangarei Bay, *Colenso*; coast opposite the Cavalhos Islands, *R. Cunningham*. The same with the Norfolk Island plant, except that the flowers are very rarely pentamerous, and the calyx smaller. There is also an allied Australian species.

## ORDER XLVI. JASMINEÆ.

(OLEINEÆ, *Fl. N. Z.*)

Trees or shrubs. Leaves opposite or subopposite, exstipulate. Flowers small, in axillary or terminal clusters racemes or panicles, often unisexual. —Calyx small, 2–4-toothed, often unequally. Petals 0 in the New Zealand species. Stamens 2, epipetalous or hypogynous. Ovary 2-celled; stigma simple or 2-fid; ovules 1 or 2 in each cell. Fruit drupaceous in the New Zealand species, containing a bony 1- or 2-celled nut. Seeds with or without albumen; embryo straight.

A considerable Order of temperate and tropical plants, to which the Jasmine and Olive belong.

### 1. OLEA, Linn.

Shrubs or trees. Leaves opposite or subopposite, entire, coriaceous. Flowers small, unisexual, in short axillary racemes or panicles.—*Male fl.*: Calyx unequally 2–4-lobed. Petals 0 in the New Zealand species. Stamens 2, with large exerted anthers; ovary rudimentary. *Female fl.*: Calyx urceolate, unequally 4-lobed. Anthers compressed, imperfect, included. Ovary oblong, 2-celled; style short; stigmas 2. Drupe oblong, 1- or 2-celled.

A large genus, scattered over the globe; the New Zealand species belong to a peculiar small section with apetalous flowers.

Leaves 3–6 in., obtuse, veins obscure. Racemes stout. Drupe  $\frac{1}{2}$  in. 1. *O. Cunninghamii*.

Leaves 2–4 in., acute, veins distinct. Racemes slender. Drupe  $\frac{1}{2}$  in. 2. *O. lanceolata*.

Leaves 1–2 in., narrow linear, obtuse. Drupe  $\frac{1}{4}$  in. . . . . 3. *O. montana*.

1. **O. Cunninghamii**, *Hook. f. Fl. N. Z.* i. 175. A lofty tree, branches with white bark, young pubescent. Leaves nearly opposite, 3–6 in. long, coriaceous, narrow oblong-lanceolate or narrow linear-oblong, obtuse, very coriaceous, nerves very obscure on both surfaces. Racemes  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, stout, erect, 10–15-flowered; bracts ovate, concave, membranous. Flowers shortly pedicelled. Male calyx of 2 very small and 2 large lobes. Drupe obliquely ovoid,  $\frac{1}{2}$  in. long, 1- or 2-celled and -seeded.—*O. apetalula*, *A. Cunn.*, not *Vahl*.

Northern and eastern parts of the **Northern Island**, *Banks and Solander*, etc. Coun-  
ounded by *A. Cunningham* with the Norfolk Island closely-allied plant.

2. **O. lanceolata**, *Hook. f. Fl. N. Z.* i. 176. A small tree, 30 ft. high, much less robust than *O. Cunninghamii*, branches slender; bark white. Leaves opposite, 2–4 in. long, narrow lanceolate or linear-lanceolate, acute,

with raised veins on both surfaces. Racemes very slender, 6-10-flowered, sparsely pilose. Flowers minute, much as in *O. Cunninghamii*, but smaller, pedicels slender. Berry ovoid, crimson,  $\frac{1}{2}$  in. long.

**Northern Island:** woods of the east coast and interior, *Colenso*.

3. *O. montana*, *Hook. f. Fl. N. Z. i. 176. t. 46 A and B (not C)*. A large bushy-headed tree, 40-50 ft. high; branches slender; bark reddish. Leaves opposite, 1-2 in. (in young plants 3-4 in.) long, very coriaceous, narrow linear,  $\frac{1}{8}$ - $\frac{1}{4}$  in. broad, obtuse, nerveless. Racemes slender,  $\frac{1}{4}$ -1 in. long, puberulous, 6-8-flowered. Flowers very minute, as in *O. Cunninghamii*. Drupe narrow ovoid,  $\frac{1}{4}$  in. long.

**Northern Island:** Bay of Islands, *Cunningham*; east coast, interior, and Wairarapa Valley, *Colenso*.

## ORDER XLVII. APOCYNÆ.

Trees or shrubs, often climbing, with milky juice. Leaves opposite exstipulate. Flowers in axillary or terminal cymes or panicles.—Calyx 5-partite or -lobed; lobes imbricate. Corolla with a short or long tube; lobes 5, contorted in bud. Stamens 5, inserted on the corolla; anthers often sagittate and adhering by their anterior face to the stigma. Ovary 2-celled (rarely 1-celled), or of 2 carpels combined by the styles or stigmas; style long or short, stigma usually angular; ovules many. Fruit of 2, slender, 1-celled capsules (rarely a berry or drupe), opening inwardly. Seeds pendulous, exalbuminous, often with a tuft of silky hairs.

A large tropical Natural Order.

### 1. PARSONSIA, Br.

Slender climbing plants; branches terete. Leaves excessively variable in form and size. Flowers small, paniced.—Calyx 5-partite; lobes within furnished with a small scale at the base. Corolla urceolate campanulate or shortly funnel-shaped; lobes 5, reflexed, eglandular. Stamens 5; anthers sagittate, included or exserted, adhering to the stigma, one cell without pollen. Hypogynous scales 5. Ovary 2-celled; style slender. Fruit of 2 long narrow, terete, acute, 1-celled capsules. Seeds with a fine silky tuft of hairs.

A small tropical Asiatic and Australian genus. I am convinced that there are but two New Zealand species of this genus, to which Raoul's names of *P. albiflora* and *P. rosea* had on the whole better be retained, to avoid the confused synonymy of Forster's name of *capsularis*, which has been variously applied.

Flowers  $\frac{1}{4}$  in. long. Anthers included . . . . . 1. *P. albiflora*.  
Flowers  $\frac{1}{8}$  in. long. Anthers exserted . . . . . 2. *P. rosea*.

1. *P. albiflora*, *Raoul*.—*P. heterophylla*, *A. Cunn.*;—*Fl. N. Z. i. 181*. Stems stout, glabrous or pubescent, as thick as a crow-quill. Leaves most often 1-2 in. long, coriaceous, oblong ovate or lanceolate, with transverse veins, more rarely linear or obovate, or narrow linear-lanceolate, 3-4 in. long, with lobed margins, in young plants spatulate. Panicles many-flowered. Flowers white, odorous,  $\frac{1}{4}$  in. long. Corolla-lobes shorter than the tube. Anthers included. Capsule 3-4 in. long.—*P. capsularis*, *Endl.*; *Deless. Ic. Scil. v. t. 49 (bad)*; ? *P. variabilis*, *Lindl.*;—*Fl. N. Z. i. 181*.

**Northern** and **Middle** Islands: abundant from the Bay of Islands to Otago, *Banks and Solander*, etc. I know nothing of the *P. variabilis*, Lindl., but suppose it to be founded on young specimens of this.

2. ***P. rosea***, *Raoul, Choir*, xvi. t. 12;—*Fl. N. Z.* i. 180. A more slender plant than the preceding. Leaves usually very long, linear, membranous, obtuse or acute at both ends, entire or undulate at the margins, 2–3 in. long, in young plants obovate or spatulate. Panicles with few scattered flowers. Corolla shortly campanulate  $\frac{1}{10}$  in. long; lobes as long as the tube. Anthers exserted.—*P. rosea* and *P. capsularis*, *Raoul*, l. c.; *Periploca capsularis*, *Forst.*

**Northern** and **Middle** Islands, abundant, *Banks and Solander*, etc.

## ORDER XLVIII. LOGANIACEÆ.

Shrubs or trees (rarely herbs). Leaves opposite, with interpetiolar stipules. Flowers usually in cymes or corymbs, regular, and hermaphrodite.—Calyx 4- or 5-lobed, -toothed, or -parted. Corolla 4- or 5-lobed, lobes imbricate, contorted or valvate, often hairy at the throat. Stamens 4 or 5, alternate with the corolla-lobes. Ovary free, 2–5-celled; style simple, stigma simple or lobed; ovules 1 or more in each cell. Fruit capsular in the New Zealand genera, 2-valved, many-seeded. Seeds albuminous.

A small Order, consisting of plants variously related, some to *Rubiaceæ*, others to *Scrophularineæ*, others to *Gentianeæ* and *Apocynæ*. The leaves often turn black when dry.

Calyx 5-partite . . . . .	1. LOGANIA.
Calyx 5-fid. . . . .	2. GENIOSTOMA.

### 1. LOGANIA, Br.

Herbs or shrubs. Flowers small, axillary or solitary, diœcious?—Calyx 5-partite, imbricate. Corolla campanulate, tube bearded, limb 5-parted, lobes imbricate. Stamens 5, inserted on the corolla. Ovary 2-celled; stigma simple; ovules numerous. Capsule 2-celled, splitting into two valves, with the seeds on their margins; valves 2-fid. Seeds small; albumen fleshy.

A large New Holland genus, not extending into Tasmania.

Leaves spreading, linear, obovate or oblong. Flower minute . . . . .	1. <i>L. depressa</i> .
Leaves 4-fariously imbricate. Flower as large as leaves . . . . .	2. <i>L. tetragona</i> .

1. ***L. depressa***, *Hook. f. Fl. N. Z.* i. 177. A prostrate, rigid, woody shrub; branches densely interlaced, puberulous. Leaves  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, coriaceous, veinless, linear-obovate or oblong, obtuse. Flowers minute, axillary, pedicelled, bracteate, solitary or in 3–5-flowered panicles, male only seen. Sepals oblong, obtuse, ciliate. Corolla scarcely longer than the calyx; lobes rounded. Filaments slender, anthers large, 2-cleft for halfway up. Ovary imperfect in my specimens (which are probably unisexual); style short, clavate; stigma oblong, thick. Fruit unknown.

**Northern** Island: Ruahine mountains, *Colenso*. Very closely allied to the *L. fasciculata*, *Muell.*, of the Australian Alps. Habit of an alpine *Coprosma*.

2. ***L. tetragona***, *Hook. f., n. sp.* Rigidly coriaceous, decumbent or prostrate; stem woody, creeping at the base, densely tufted; branches ascending, short, densely leafy, pubescent, 1–2 in. long, with the leaves on  $\frac{1}{4}$  in. diam. Leaves densely 4-fariously imbricate, spreading, oblong, obtuse, quite entire,



very coriaceous, concave, ciliated towards the base, connate in pairs at the very base, keeled margins thickly cartilaginous. Flower solitary, sessile, terminal, seen with old fruit only. Calyx about as large as the leaves; tube turbinate; lobes 4, oblong, obtuse, ciliated, rather distant. Capsule coriaceous, 4-valved.

**Middle Island**: Otago, lake district, alpine, *Hector and Buchanan*.

## 2. GENIOSTOMA, Forst.

Characters of *Logania*, but the valves of the capsule not 2-fid nor 2-partite, the æstivation of the corolla-lobes contorted, and the calyx less deeply divided.

A considerable genus of Madagascar and Bourbon, the Asiatic and Polynesian islands, not found in continental Africa, nor in Australia.

1. **G. ligustrifolium**, *A. Cunn.*;—*Fl. N. Z.* i. 177. A perfectly glabrous shrub or small tree; branches slender. Leaves  $1\frac{1}{2}$ –3 in. long, ovate-oblong, acuminate, membranous. Flowers in short, axillary and lateral corymbs,  $\frac{1}{2}$  in. diam., white; peduncles and pedicels bracteolate. Corolla-tube very short, lobes reflexed. Ovary globose, with a very short style and large 2-lobed stigma. Capsules on slender divaricating pedicels, globose, mucronate,  $\frac{1}{8}$  in. diam., valves separating from the placentiferous axis.—Hook. Ic. Pl. t. 430.

**Northern Island**: not uncommon in woods, etc., *Banks and Solander*, etc.

## ORDER XLIX. GENTIANEÆ.

Herbs, usually glabrous and bitter. Leaves opposite, exstipulate, quite entire. Flowers solitary or cymose, often handsome.—Calyx 4- or 5-lobed. Corolla 4- or 5-cleft or lobed, contorted in bud, persistent. Stamens 5, inserted on the corolla. Ovary 1-celled, with 2 parietal placentas often projecting into the cavity, and dividing it into 2–4 cells; styles 1 or 2, stigma 2-lobed or 2-capitate; ovules numerous. Capsule (rarely a berry) usually membranous, elongate, septicidally 2-valved. Seeds small; albumen fleshy.

A large tropical and temperate Order, especially abounding in mountainous regions.

Flowers large, white or yellowish or purplish. Style 1. Stigma 2-lobed . . . 1. GENTIANA.  
Flowers small, yellow. Ovary with 2 styles . . . . . 2. SEBÆA.

## 1. GENTIANA, Linn.

Erect or ascending, simple or branched herbs, with conspicuous flowers.—Calyx 4- or 5-cleft. Corolla 4- or 5-cleft, campanulate or rotate. Anthers not twisted, turning back, and so becoming extrorse. Ovary linear; style 1, stigma bifid. Capsule septicidal, elongated, membranous.

A large mountain genus, found in all parts of the world. The species are most variable, and the New Zealand ones especially so, insomuch that in framing characters for the species I have had to take prevalent forms and to disregard intermediate ones, which occur in abundance between all. Some Chili species are too close to the New Zealand, but I hesitate to unite them, without better materials.

Root annual (sometimes perennial in 3).

Stems very slender, 1- or few-flowered. Stem leaves few. Calyx-lobes subulate . . . . . 1. *G. montana*.

- Stems short, robust, very leafy, many-flowered. Calyx-lobes linear-oblong, obtuse . . . . . 2. *G. concinna*.  
 Stems robust, many-flowered. Stem-leaves few. Flowers corymbose. Calyx-lobes oblong . . . . . 3. *G. pleurogynoides*.  
 Root perennial.  
 Stems ascending, few-leaved, 1- or many-flowered. Calyx-lobes oblong or ovate . . . . . 4. *G. saxosa*.  
 Stems prostrate, very leafy. Calyx-lobes spathulate, as long as the corolla . . . . . 5. *G. cerina*.

1. ***G. montana***, *Forst.*;—*Fl. N. Z.* i. 178. Root slender, filiform, annual. Stems generally many from the root, very slender, 4–18 in. high, usually ascending, 1- or few-flowered, sparingly leafy. Leaves: radical spathulate, with long or short petioles,  $\frac{1}{2}$ –2 in. long, rather membranous; cauline sessile, ovate or oblong, obtuse. Flowers on slender pedicels,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long. Calyx deeply divided; lobes subulate-lanceolate, acuminate. Corolla-lobes oblong, subacute.—*G. Grisebachii*, Hook. f. in Hook. Ic. Pl. 636.

**Northern** Island: mountainous districts; Tongariro, *Edw.* Common throughout the **Middle** Island, *Forster*, ascending to 3000 ft. Also common in Tasmania and the alps of Victoria, in both which countries it attains a larger size, and more corymbose habit. I cannot distinguish seedling states of *G. saxosa* and *pleurogynoides* from this.

2. ***G. concinna***, *Hook. f.*; *Fl. Antart.* i. 53. t. 35. Root slender, annual. Stems numerous from the root, erect or ascending, 2–12 in. long, rather stout, leafy. Leaves all linear-oblong or spathulate-oblong,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long, coriaceous, obtuse, often recurved. Flowers about  $\frac{1}{2}$  in. long. Calyx deeply divided; lobes often as long as corolla, linear-oblong, obtuse. Corolla lobes narrow, obovate-oblong, obtuse.

**Lord Auckland's** group and **Campbell's** Island: abundant on the hills, *J. D. H.* The stouter leafy habit and form of the calyx-lobes best distinguish this from *G. montana*. It is extremely variable; shoots have often leaves 3 in. long, linear-oblong, and 3-nerved.

3. ***G. pleurogynoides***, *Griseb.*—*G. saxosa*,  $\gamma$ , *Fl. N. Z.* i. 178. Root slender or stout, usually annual. Stems solitary or numerous from the root, erect, rarely ascending, always stout, 4–20 in. high, sparingly leafy. Leaves: radical  $\frac{1}{2}$ –3 in. long, very coriaceous, rosulate, petioled, spathulate; cauline in distant pairs, oblong-ovate or ovate-cordate, short or long. Flowers yellowish, very handsome, usually large,  $\frac{1}{2}$ –1 in. long, in terminal umbels or corymbs. Calyx not deeply divided; lobes oblong or ovate, subacute or acute, very variable in length. Corolla-lobes usually much larger and broader than in the two preceding.

**Northern** Island: summit of Ruahine range, *Colenso*. **Middle** Island: abundant on all the mountains, ascending to 5000 ft., *Forster*, etc. The usually simple, stout, erect, sparingly leafy stem, and corymbose large flowers are the best characters of this beautiful form. A common Tasmanian plant.

4. ***G. saxosa***, *Forst.*;—*Fl. N. Z.* i. 178. Root stout or slender, perennial. Stems usually numerous, erect or ascending, stout or slender, 2–6 in. high, sparingly leafy, 1- rarely many-flowered. Leaves: radical numerous, often rosulate, spathulate or oblong,  $\frac{1}{2}$ –3 in. long, coriaceous; cauline oblong-ovate or ovate-cordate. Flowers usually large,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long. Calyx-lobes excessively variable in depth and form. Corolla-lobes broadly obovate-oblong, obtuse.

Var.  $\alpha$ . Stems numerous, short, ascending, 1-2-flowered. Leaves rosulate, spatulate. Calyx divided  $\frac{2}{3}$  way down; lobes ovate-oblong, acute. (Like *G. montana*, but perennial.)—*G. bellidifolia*, Hook. f. in Hook. Ic. Pl. t. 635.

Var.  $\beta$ . Stems stout, branched, erect, leafy, many-flowered. Calyx divided  $\frac{2}{3}$  way down, lobes linear-oblong. (Like *G. pleurogynoides*, but perennial.)

Var.  $\gamma$ . Stems erect, very stout, simple, sparingly leafy. Leaves often large, thick, and fleshy. Flowers very numerous, large, corymbose. Calyx short, divided to the middle; lobes ovate-acute or acuminate. (Like *G. pleurogynoides*, but perennial, and calyx very peculiar, unlike any except some forms of var.  $\alpha$ .)

**Northern and Middle Islands.** Var.  $\alpha$ . Abundant in the mountains, *Forster*, etc., ascending to 6000 ft. Var.  $\beta$ . Sinclair range and elsewhere; Southern Alps, ascending to 6000 ft., *Sinclair and Haast*. Var.  $\gamma$ . Nelson mountains, *Bidwill* (with *G. pleurogynoides*); Port Cooper, *Lyall* (very large state); Upper Wairau, *Sinclair* (root leaves 3 in. long, linear-oblong); Mount Darwin and mountains near Lake Tekapo, alt. 3-5000 ft., *Haast* (very stout forms with very broad and fleshy leaves). The calyx of var.  $\gamma$ , in conjunction with its habit, would indicate a different species, were it not that the same calyx occurs in genuine *G. saxosa*, var.  $\alpha$ .

5. **G. cerina**, Hook. f. *Fl. Antarct.* i. 55. t. 36. Root perennial, stems very numerous, branched, stout, trailing, very leafy, 8-16 in. long, as thick as a quill. Leaves very thick, coriaceous, obovate- or spatulate-oblong,  $\frac{2}{3}$ -1 $\frac{1}{2}$  in. long; radical and cauline similar, 3-nerved. Flowers several together, crowded towards the ends of the branches, sunk amongst the leaves,  $\frac{1}{3}$ - $\frac{1}{2}$  in. long. Calyx deeply divided; lobes large, oblong-spatulate, often recurved, longer than the corolla-tube. Corolla-lobes broad, white, with red-purple nerves.

**Lord Auckland's group:** on rocky islets, etc., near the sea, abundant, *J. D. H.* A most beautiful plant; remarkable for the thick, trailing leafy stems, bright-green, shining, succulent foliage, and large calyx-lobes.

## 2. SEBÆA, Solander.

Erect, glabrous, annual herbs, with simple or divided, sparingly leafy stems. Flowers cymose, small.—Calyx 4- or 5-parted; lobes keeled or winged. Corolla 4- or 5-fid, persistent in fruit; tube straight; lobes twisted after flowering. Stamens 5, at the mouth of the corolla; anthers finally twisted a little. Ovary 2-celled; styles 2, straight, stigmas capitate. Capsule of 2 linear-pointed valves, separating from a seed-bearing axis.

A small, tropical, and Southern African genus, also found in Australia and Tasmania.

1. **S. ovata**, Br.;—*Fl. N. Z.* i. 179. Stem slender, 4-10 in. high, 4-angled. Leaves 2 or 3 pairs,  $\frac{1}{4}$  in. long, sessile, obtuse, very broadly ovate. Flowers  $\frac{1}{2}$  in. long, yellow, 5-fid. Calyx-lobes ovate-lanceolate, keeled.—*S. gracilis*, A. Cunn. Prodr.

**Northern and Middle Islands:** bogs at Hokianga, *A. Cunningham*; grassy places, Ahuriri, *Colenso*; Port Cooper, *Lyall*. Also found in Australia and Tasmania, and very nearly related to a Madagascar species.

## ORDER L. BORAGINEÆ.

Herbs, often hispid with stiff hairs. Leaves alternate, simple, quite entire, exstipulate. Flowers rarely solitary, usually in 1-sided, scorpioid racemes or spikes, often variable in colour.—Calyx 5-lobed or -partite. Corolla regular,

5-lobed, imbricate in bud, throat often closed with swellings or scales opposite the lobes. Stamens 5, inserted in the throat of the corolla, included or exerted. Anthers with 2 parallel cells. Ovary deeply 4-lobed, 4-celled; style inserted between the lobes, stigma capitate; ovule 1 in each cell. Fruit of 4 simple, smooth crested spinous or winged nuts, often resembling naked seeds. Embryo straight; albumen little or 0.

A large Natural Order, especially in Europe and oriental regions; also found all over the globe. The above character does not include the tribe *Cordiaceæ*, of which there is no New Zealand representative, and which includes shrubs and large trees, with the leaves often serrated, the ovary not lobed, and the fruit a 4-celled drupe or nut.

Corolla salver-shaped. Stamens included. Nuts minute, polished . . . 1. *MYOSOTIS*.

Corolla more or less campanulate. Stamens exerted. Nuts minute, polished . . . 2. *EXARRHENA*.

Corolla rotate. Nuts large, with broad wings . . . 3. *MYOSOTIDUM*.

### 1. *MYOSOTIS*, Linn.

Annual or perennial herbs. Leaves usually spathulate or ovate, radical petioled, cauline sessile. Flowers small, in scorpioid racemes, or solitary and axillary, or solitary sessile and terminal.—Calyx 5-lobed or -partite. Corolla slender, long or short, cylindric; limb expanded; lobes 5, patent; throat with 5 swellings. Stamens 5; anthers sessile or filaments very short, included. Nuts minute, ovoid, compressed, very shining.

A large European genus, to which the "Forget-me-not" belongs. Three New Zealand species differ from all their congeners in having solitary sessile terminal flowers.

#### 1. *Flowers solitary, sessile, terminal. Leaves small, imbricate.*

- |  |                           |
|--|---------------------------|
| Stems 1 in., tufted. Leaves narrow linear-oblong . . . . .       | 1. <i>M. uniflora</i> .   |
| Stems 1 in., tufted. Leaves broadly oblong-quadrate . . . . .    | 2. <i>M. pulvinaris</i> . |
| Stems 1 in., tufted. Leaves broadly obovate-spathulate . . . . . | 3. <i>M. Hectori</i> .    |

#### 2. *Flowers all solitary and in the axils of the leaves or below them.*

- |  |                           |
|--|---------------------------|
| Leaves distant, petioled. Flowers pedicelled . . . . .       | 4. <i>M. spathulata</i> . |
| Leaves close-set, sessile. Flowers minute, sessile . . . . . | 5. <i>M. antarctica</i> . |

#### 3. *Flowers all in terminal racemes, or the lower only axillary.*

- |   |                          |
|---|--------------------------|
| Erect, very hispid. Flowers all racemose. Pedicels short. Nuts ovoid, black . . . . .                     | 6. <i>M. australis</i> . |
| Prostrate, slender. Lower flowers axillary. Petioles and pedicels slender. Nuts orbicular, pale . . . . . | 7. <i>M. Forsteri</i> .  |
| Stout, erect. Petioles broad. Flowers pedicelled. Calyx-hairs appressed . . . . .                         | 8. <i>M. capitata</i> .  |
| Stout, erect, very hispid. Flowers sessile. Calyx-hairs spreading . . . . .                               | 9. <i>M. Traversii</i> . |

1. *M. uniflora*, Hook. f., n. sp. A small, densely-tufted, much-branched perennial, forming rounded masses; hoary with appressed, rigid, spicular hairs, that are rough under the microscope; root woody, tortuous; branches slender, erect, fascicled,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. high, densely leafy throughout. Leaves erect, imbricating, close-set,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, sessile, narrow linear-oblong, obtuse, a little dilated at the base and often above the middle, nearly glabrous on the upper surface, rather coriaceous. Flower terminal, yellow, solitary, sessile, nearly  $\frac{1}{4}$  in. long. Calyx-lobes linear-oblong, covered with straight rigid hairs. Corolla with a long, rather slender tube, twice or more as long as the calyx; lobes short, rounded. Stamens included. Nuts ovoid, acute.



**Middle Island:** on shingle beds on the mountains, often forming rounded masses; Hopkins river, alt. 2-3500 ft., *Haast*.

2. **M. pulvinaris**, *Hook. f., n. sp.* A small, densely-tufted, much-branched perennial, forming soft, rounded, mossy cushions, hoary with soft white hairs. Branches 2-3 in. long. Leaves most densely imbricated in many series all round the branches, closely overlapping, sessile,  $\frac{1}{6}$ - $\frac{1}{4}$  in. long,  $\frac{1}{8}$  broad, broadly obovate or oblong-quadrate, rounded or retuse at the herbaceous tip, slightly narrowed below and very membranous, 1-nerved. Flower white, terminal, solitary, sessile, nearly  $\frac{1}{4}$  in. long. Calyx-lobes linear, obtuse, covered with soft white hairs. Corolla-tube funnel-shaped, twice as long as the calyx; lobes short, rounded. Stamens included. Nuts not seen.

**Middle Island:** alps of Otago, alt. 6000 ft., *Hector and Buchanan*. A most remarkable little plant.

3. **M. Hectorsi**, *Hook. f., n. sp.* Habit and appearance of *M. pulvinaris*, but less soft. Leaves broadly obovate-spathulate, contracted into a broad, coriaceous, glabrous petiole. Flowers white, shortly peduncled. Nuts narrow ovate-oblong, shining.

**Middle Island:** Otago, dry localities in the lake district, *Hector and Buchanan*.

4. **M. spathulata**, *Forst.;—Fl. N. Z. i. 201.* A flaccid, decumbent, pilose or slightly hispid annual. Stems branched from the base, prostrate, ascending at the tips, 3-10 in. long, leafy at intervals. Leaves with short or long petioles,  $\frac{1}{10}$ - $\frac{1}{2}$  in. long, blade  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, orbicular-obovate or -oblong, apiculate, membranous, hispidulous on both surfaces. Flowers all axillary or on the stem below the leaves, solitary, on slender peduncles longer than the petiole, white with a yellow eye. Calyx-lobes linear, acuminate, shorter than the short funnel-shaped corolla-tube. Corolla  $\frac{1}{8}$ - $\frac{1}{4}$  in. diam.; lobes rounded. Stamens included. Nuts ovoid, pale, very shining, compressed edges thin. —*Anchusa spathulata*, *Rœm. and Schultes*.

**Northern Island:** dry stony places, not unfrequent, *Banks and Solander*, etc. **Middle Island:** Nelson, *Travers*; Wakefield, *Munro*. Both this and *M. Forsteri* are figured amongst Forster's drawings as *M. spathulata*.

5. **M. antarctica**, *Hook. f. Fl. N. Z. i. 201.* A small, very hispid, much-branched, depressed perennial. Stems many, spreading from the root, 1-4 in. long, prostrate with ascending tips, rather stout, very leafy. Leaves sessile, somewhat recurved,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, obovate- or spathulate-oblong, obtuse or apiculate, hoary on both surfaces with rigid white hairs. Flowers solitary, axillary, blue yellow or white, nearly sessile,  $\frac{1}{10}$  in. long. Calyx-lobes short, ovate-lanceolate, subacute, hispid with appressed straight hairs. Corolla-tube cylindric, as long or twice as long as the calyx; lobes short, rounded. Stamens included. Nuts ovoid, very shining, black.—*Fl. Antarct. 57. t. 38.*

**Northern Island:** mountainous districts of the east coast and interior, *Colenso*. **Middle Island:** Upper Waihopai, *Munro*; Tarndale plains, alt. 4000 ft., *Travers*; terraces on the Hopkins, alt. 2-3000 ft., *Haast*; Otago, Torbury Heads, Dunedin, *Lindsay*; lake district, subalpine, *Hector and Buchanan*. **Campbell's Island**, *J. D. H.* This seems to be identical with a plant from the Straits of Magalhaens.

6. **M. australis**, *Br.;—Fl. N. Z. i. 201.* An erect hispid annual herb,  
VOL. I. O

6–10 in. high, branched from the base; branches rather stout, ascending, sparingly leafy. Leaves, radical 1–2 in. long, narrowed into long petioles, oblong-spathulate, obtuse, hispid on both surfaces; cauline shorter, sessile, linear-oblong or spathulate, all very hispid with rigid hairs on both surfaces. Racemes terminal, elongate, many-flowered, hispid with spreading simple and hooked hairs. Flowers yellowish, shortly pedicelled. Calyx oblong, 5-lobed to near the base; lobes linear, acute, hispid with spreading hooked hairs. Corolla very variable,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad, tube funnel-shaped; lobes short, rounded. Stamens included. Nuts ovoid, black, very shining.

**Middle Island**: abundant in dry stony places, Hurumui and Wairau valleys, 1–3500 ft., *Travers*; Tarndale, alt. 4–5000 ft., *Sinclair*; terraces and moraines at Lake Okau, *Haast*; Waihopai and Aglionby plains, *Munro*; Otago, *Lyall*. Also a native of Australia and Tasmania.

**7. M. Forsteri**, *Rœm. and Sch.*;—*Fl. N. Z.* i. 200. A prostrate, branched, slender, subhispid and pilose annual. Stems branching from the base, ascending, flaccid, 8–16 in. long. Leaves, radical and lower cauline with long slender petioles,  $\frac{1}{2}$ –2 in. long; blade oblong-spathulate, obtuse, membranous, hispidulous on both surfaces; upper leaves oblong-obovate. Flowers axillary and in terminal hispid racemes, variable in size, lower on pedicels  $\frac{1}{4}$ – $\frac{1}{2}$  in. long. Calyx  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, campanulate, 5-lobed to the middle; lobes linear-oblong, acute, hispid with spreading hooked hairs. Corolla-tube funnel-shaped, as short as or longer than the calyx; limb  $\frac{1}{2}$ – $\frac{1}{3}$  in. broad; lobes rounded. Stamens included. Nuts nearly orbicular, pale, very shining.

**Northern Island**: dry places, east coast, etc., *Banks and Solander*, *Colenso*. **Middle Island**: Nelson, *Sinclair*; Milford Sound, *Lyall*; Canterbury, *Raoul*; *Travers*.

**8. M. capitata**, *Hook. f. Fl. Antarct.* 56. t. 37; *Fl. N. Z.* i. 201. A robust perennial, covered with soft, appressed, scarcely hispid hairs; stems ascending 6–18 in. high, stout, leafy. Leaves, radical linear-obovate or lanceolate, obtuse, 2–4 in. long, narrowed into broad petioles, hispid-pilose on both faces; cauline linear-oblong or spathulate, sessile. Racemes large, simple or branched, often forming a dense very many-flowered head. Flowers very crowded, violet-blue or purple; pedicels short, stout. Calyx  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, 5-partite; lobes hispid with appressed straight hairs. Corolla-tube cylindric, little longer than the calyx; limb  $\frac{1}{4}$  in. diam.; lobes rounded. Stamens included. Nut ovoid, obtuse, polished.

**Middle Island**: upper part of Macrae's Run, *Munro*; Ruapuke Island and Port William, *Lyall*; trap cliffs at Shaw's Bay, Otago, *Lindsay*. **Lord Auckland's group**, *J. D. H.*

**9. M. Traversii**, *Hook. f. n. sp.* An erect, rather rigid, densely hispid perennial, 3–8 in. high; stems several from the root, stout, erect or ascending, leafy, very hispid with erect or spreading hairs. Leaves: radical narrow linear-spathulate, obtuse, 1–1½ in. long, narrowed into short petioles, hispid on both surfaces; cauline linear-oblong. Racemes densely hispid, capitate, many-flowered. Flowers almost sessile, lemon-coloured. Calyx  $\frac{1}{6}$  in. long, 5-partite; lobes linear, hispid with rigid, spreading, simple and hooked bristles. Corolla funnel-shaped, rather longer than the calyx; lobes rounded. Stamens included. Nuts narrow ovoid, obtuse, very polished.

**Middle Island**: shingle beds on Tarndale, alt. 5–6000 ft., *Sinclair*; Wai-au valley and

Discovery Peaks, alt. 5500 ft., *Travers*; Waimakeriri valley, alt. 2500 ft., and Mount Darwin, alt. 4500-6500 ft., *Haast*; Otago, lake district, *Hector and Buchanan*. Near *M. capitata*, but smaller, much more hispid, with often hooked bristles on the calyx, and nuts much longer and narrower. In the form of the flower this tends towards *Exarrhena*.

## 2. EXARRHENA, Br.

Hispid, erect, rarely prostrate herbs. Leaves, radical petioled, cauline sessile. Flowers usually large, in scorpioid cymes.—Calyx narrow, 5-lobed or -partite. Corolla narrow, funnel-shaped or tubular, with an expanded limb; throat usually without thickenings; lobes 5, spreading. Stamens with long exerted filaments. Nuts as in *Myosotis*.

An Australian, Tasmanian, and New Zealand genus, very near to *Myosotis*, but no species of the latter genus have flowers so large and campanulate as the majority of *Exarrhena* have, and the length of the filaments, though a very variable character, is a very manifest one.

- |   |                          |
|---|--------------------------|
| Slender, diffuse, prostrate. Leaves broad, on slender petioles . . . . .  | 1. <i>E. petiolata</i> . |
| Stout, suberect, very hispid. Calyx 5-partite. Corolla $\frac{1}{2}$ – $\frac{2}{3}$ in. long.<br>Nuts linear . . . . . | 2. <i>E. macrantha</i> . |
| Stout, suberect, sparingly hairy. Flowers pedicelled. Calyx 5-lobed.<br>Nuts broad, short, black. . . . .               | 3. <i>E. Lyallii</i> .   |
| Suberect, hispid. Flowers sessile. Calyx 5-partite. Corolla $\frac{1}{4}$ – $\frac{1}{2}$ in.<br>Nuts linear . . . . .  | 4. <i>E. saxosa</i> .    |

1. ***E. petiolata*, Hook. f.**—*Myosotis petiolata*, Fl. N. Z. i. 202. A slender diffuse perennial?, covered with short scabrid or hispid hairs. Stems many from the root, 3–12 in. long, slender, prostrate and ascending, sparingly leafy. Leaves: radical and lower cauline with long slender petioles,  $\frac{1}{2}$ –2 in. long, rounded elliptic-oblong, apiculate,  $\frac{2}{3}$ –1 $\frac{1}{2}$  in. long; cauline sessile, obovate-spathulate; all membranous, with short scattered hairs on both surfaces. Racemes slender, elongate, many-flowered, simple or forked. Flowers on slender pedicels. Calyx  $\frac{1}{3}$  in. long, parted deeply; lobes linear, hairs straight, appressed. Corolla with a very short funnel-shape tube, and 5 oblong spreading lobes,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam. Filaments very slender, elongate; anthers shortly oblong. Nuts broadly ovoid, very shining, red-brown.

**Northern Island:** dry stony places and alluvial river banks, Cape Turnagain, Puchutai, Hawke's Bay, etc., *Colenso*. Habit of *Myosotis Forsteri*, but flowers totally different.

2. ***E. macrantha*, Hook. f., n. sp.** A rather stout, suberect perennial, covered with appressed or spreading, rather hispid hairs. Stems 6–12 in. high, ascending, stout, leafy. Leaves: radical 2–4 in. long, lanceolate-oblong, narrowed into broad petioles; cauline 1–2 in., linear-oblong, all softly hispid on both surfaces. Raceme short, many-flowered, simple or branched, very hispid. Flowers purple or white, close-set, large, all pedicelled. Calyx  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, deeply 5-partite; lobes linear, hairs appressed or spreading, simple or hooked. Corolla  $\frac{1}{2}$ – $\frac{2}{3}$  in. long, tube much longer than the calyx, funnel- or almost bell-shaped; lobes broad, oblong. Stamens exerted, filaments slender; anthers linear. Nuts linear-oblong,  $\frac{1}{6}$  in. long.

**Middle Island:** Dun mountain, *Sinclair*; Wairau and Wai-au, on mountains, alt. 3–5000 ft., *Travers*; Hopkins river, by waterfalls, alt. 3500 ft., *Haast*; Otago, Lindis Hills, subalpine, *Hector and Buchanan*. A good deal like *Myosotis capitata* in habit, foliage, and pubescence.

3. **E. Lyallii**, *Hook. f.*—*Myosotis Lyallii*, Fl. N. Z. i. 202. A rather short and stout tufted perennial, slightly hispid with appressed hairs. Stems several from the root, erect or ascending, rather stout, 2–6 in. high. Leaves: radical oblong-spathulate or obovate-lanceolate, subacute,  $1-1\frac{1}{2}$  in. long, narrowed into rather slender petioles; cauline narrow linear-oblong or oblong-spathulate; all slightly hispidulous on both surfaces with appressed hairs. Raceme short, simple or forked. Flowers very shortly pedicelled. Calyx  $\frac{1}{4}$  in. long, hispid with appressed or patent, simple and hooked bristles. Corolla  $\frac{1}{6}-\frac{1}{4}$  in. long; tube cylindric, longer than the calyx; lobes short, rounded. Stamens with long slender filaments; anthers linear. Nuts broadly ovate or orbicular, very black and shining.

**Middle Island**: Milford Sound, *Lyall*. Habit of a small specimen of *Myosotis capitata*, but the flower is very different. I have but two specimens.

4. **E. saxosa**, *Hook. f.*—*Myosotis saxosa*, Fl. N. Z. i. 202. A small, rigid, prostrate perennial, more or less densely hispid (sometimes white) with rather spreading white hairs. Stems 2–6 in. long, rather stout, leafy, prostrate; racemiferous branches ascending, stout or slender. Leaves: radical obovate- or lanceolate-spathulate, acute,  $\frac{1}{2}-\frac{3}{4}$  in. long, narrowed into a broad or narrow petiole, rather harsh and rigid, uniformly hispid-pilose on both surfaces; cauline linear-oblong,  $\frac{1}{3}-\frac{1}{2}$  in. long. Raceme small, few-flowered. Flowers nearly sessile. Calyx  $\frac{1}{6}-\frac{1}{4}$  in. long, deeply partite; lobes linear,  $\frac{1}{6}$  in. diam. Stamens exserted; filaments slender; anthers linear-oblong. Nuts  $\frac{1}{10}$  in. long, narrow linear-oblong.

**Northern Island**: east coast, crags at Tetiokura, *Colenso* (very white and hispid).

**Middle Island**: Dun mountain, in open stony places, *Munro, Travers* (much less hispid).

### 3. MYOSOTIDIUM, Hook.

A succulent herb, 1–3 ft. high, perennial or biennial. Leaves large, lower petioled, ovate, obtuse, with parallel veins. Flowers pale blue, in dense branched scorpioid racemes.—Calyx 5-partite. Corolla rotate; lobes 5, rounded, expanded; throat closed with 5 protuberances. Stamens 5, inserted within the tube; anthers included. Ovary 4-lobed; style very short, stigma capitate. Fruit large, between globose and pyramidal, 4-angled, of 4 dorsally much-flattened coriaceous winged nuts, adhering to a central fleshy column.

A remarkable genus, perhaps too near to *Cynoglossum* and *Omphalodes*, differing from the former in the margined nuts, which do not bear barbed bristles, and from the latter in the wing of the nut not being inflexed; all should probably merge into one genus.

1. **M. nobile**, *Hook. Bot. Mag. t.* 5137. Stem stout, pilose. Radical leaves a span long, broadly ovate or ovate-cordate, very thick and fleshy, glabrous, shining, bright green; cauline sessile, oblong. Racemes collected into a dense large subglobose head, 2–5 in. diam. Flowers pedicelled. Calyx-lobes oblong, obtuse, hispid. Corolla  $\frac{1}{2}-\frac{2}{3}$  in. diam., deep azure in the centre with a purple eye, fading towards the ends of the lobes. Fruit as large as a hazel-nut.—*Cynoglossum nobile*, *Hook. f.* in Gard. Chron. 1858, p. 240.



**Chatham Island, Watson.** I have no native specimens, the above description being drawn up from cultivated ones.

I find amongst Sinclair's plants, without habitat, a small scrap of a *Cynoglossum*, from the neighbourhood of Auckland. The genus may be known from *Myosotis* by the nuts covered with barbed bristles; the species looks like the common tropical *C. micranthum*, and is probably an introduced weed.

## ORDER LI. CONVOLVULACEÆ.

Climbing or trailing, rarely erect herbs or shrubs, usually with milky juice. Leaves alternate, exstipulate (0 in *Cuscuta*). Flowers regular, hermaphrodite, axillary or terminal, solitary or cymose, often large.—Sepals 5, rarely united, imbricate, persistent. Corolla bell- or funnel-shaped or rotate, limb 5-angled and plaited or 5-lobed and imbricate. Stamens 5, inserted on the corolla, alternate with its lobes, often unequal; anthers free. Ovary free, undivided or 2-lobed, 2–4-celled; style simple or 2-fid, or styles 2, stigmas various; ovules 1 or 2, erect in each cell. Fruit various. Albumen mucilaginous or 0; cotyledons usually folded; embryo curved or spiral in *Cuscuta*.

A very large tropical Order, rarer in the temperate zones, though common in Europe.

Stems leafy, prostrate or twining.

Corolla plaited. Style 1; stigmas 2 . . . . . 1. CONVOLVULUS.

Corolla plaited. Style 1; stigma capitate, lobed . . . . . 2. IPOMÆA.

Corolla rotate. Styles 2; stigmas capitate . . . . . 3. DICHONDRA.

Stems leafless, twining, parasitic . . . . . 4. CUSCUTA.

### 1. CONVOLVULUS, Linn.

Climbing or prostrate herbs, with milky juice, slender stems, and usually large perennial rhizomes. Flowers large, axillary, solitary or cymose.—Corolla funnel- or bell-shaped, border 5-angled, plaited. Stamens nearly equal, included. Ovary on an annular disk, incompletely 2-celled; style slender, stigmas 2; ovules 4. Capsule 1-celled, 2–4-seeded.

A very large and widely distributed genus.

Bracts large, enclosing the calyx. Peduncles terete.

Climbing. Leaves 2–4 in., oblong-sagittate, acuminate, deeply 2-lobed at base . . . . . 1. *C. Sepium*.

Prostrate. Leaves  $\frac{1}{2}$ –1 $\frac{1}{2}$  in., ovate or deltoid cordate, acute . . . . . 2. *C. Tuguriorum*.

Prostrate. Leaves reniform . . . . . 3. *C. Soldanella*.

Bracts enclosing the calyx. Peduncles winged . . . . . 4. *C. marginata*.

Bracts small, on the peduncles . . . . . 5. *C. erubescens*.

1. **C. Sepium, Linn.**;—*Calystegia Sepium*, Br.; Fl. N. Z. i. 183. Stem slender, climbing, and leaves glabrous or pubescent. Leaves large, 2–4 in. long, oblong-sagittate, acuminate, deeply lobed at the base, lobes rounded angled or truncate. Bracts enclosing the calyx and longer than it, ovate or oblong, obtuse or acute. Peduncles 1-flowered, generally twice as long as the petioles, angled or margined. Corolla 2–4 in. broad, white or rose-coloured.

Abundant throughout the islands, *Banks and Solander*, etc. The common Convolvulus or "Bindweed" of England. Rhizome eaten by the natives. Also common in Europe, Australia, and various temperate countries in both hemispheres.

2. **C. Tuguriorum**, *Forst.*;—*Calystegia Tuguriorum*, Br.; Fl. N. Z. i. 183. t. 47. Stem slender, prostrate, rarely climbing, 12–24 in. long, and leaves glabrous. Leaves  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, broadly ovate-cordate or deltoid, acute or obtuse, entire lobed sinuate or angled, sinus at the base broad. Peduncles longer than the petioles, terete or margined. Bracts as long as the calyx and enclosing it, orbicular or cordate. Corolla 1–2 in. across, white or rose-coloured. Capsule ovate, acute,  $\frac{1}{4}$  in. long. Seeds yellow, small.

Abundant throughout the islands, *Banks and Solander*, etc. A much smaller plant than the preceding, but large specimens are often difficult to distinguish. The same plant is found in Valdivia and Chiloe.

3. **C. Soldanella**, *Linn.*;—*Calystegia Soldanella*, Br.; Fl. N. Z. i. 183. Stems prostrate, glabrous or puberulous, 1 ft. long, stouter than in the preceding. Leaves broader than long,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. diam., reniform or cordate-reniform, acute or obtuse and apiculate, sometimes rather fleshy, sinus at the base broad and open, entire or rarely lobed. Peduncles terete, longer than the leaves. Bracts enclosing the calyx, broadly orbicular or cordate, obtuse or apiculate. Corolla rose-red, 1–2 in. broad. Capsule large, globose. Seeds large, black.

**Northern** Island: shores near Auckland, *Sinclair*. **Middle** Island: Canterbury, *Haast*; Bluff Island, *Lyall*. The southern specimens are identical with the European and Australian; the Auckland ones approach *C. Tuguriorum* in foliage, and in the absence of fruit may be referable to a state of that plant. This species is found in many temperate and tropical shores.

4. **C. marginata**, *Hook. f.*—*Calystegia marginata*, Br.; Fl. N. Z. i. 184. t. 48. Stems slender, climbing, quite glabrous. Leaves 1–2 in. long, broadly sagittate, acuminate, the basal lobes long, diverging, obtuse or acute, entire lobed or 2-fid. Peduncle shorter than the petiole, with two often crisped wings. Flowers small. Bracts cordate-ovate, obtuse, half as long as the corolla. Corolla white,  $\frac{1}{2}$  in. diam.

**Northern** Island: Wangarui and Owai, on the east coast, *Colenso*; Bay of Islands?, *Sinclair*. Also a native of eastern Australia.

5. **C. erubescens**, *Br.*;—*Fl. N. Z. i.* 185. Stems prostrate, 4–12 in. long, rarely twining, and leaves glabrous pubescent or silky. Leaves very variable,  $\frac{1}{6}$ – $\frac{1}{2}$  in. long, oblong hastate or cordate, obtuse, quite entire or sinuate. Peduncles longer than the petioles, with two small subulate bracts above the middle. Sepals broadly oblong, rounded at the tip, coriaceous, silky. Corolla white or rose-coloured,  $\frac{1}{3}$ – $\frac{2}{3}$  in. diam. Capsule globose. Seeds rugose.

**Northern** Island: south-west head of Palliser Bay, *Colenso*. **Middle** Island: banks of the Waihopai, *Munro*; Port Cooper, *Lyall*, *Bolton*; Otago, Lower Waitaki river, *Hector and Buchanan*. The flowers appear to be most frequently white in New Zealand. A very common Australian plant, closely allied to the European *C. arvensis*, and some others of very wide distribution.

## 2. IPOMŒA, Linn.

Climbing herbs (rarely erect), with milky juice, resembling *Convolvulus*, except that the stigma is capitate, 2- or 3-lobed, and the capsule 2- or 3-celled.

A very large tropical and subtropical genus, to which the Sweet-Potato, or Kumerabo, of

the New Zealander belongs; this (*Batatas edulis*, Choisy; *Convolvulus chrysorrhizus*, Forst.) is cultivated all over the Pacific, and was introduced by the earliest inhabitants.

1. **I. tuberculata**, *Rœm. and Sch.*;—*I. pendula*, Br.; Fl. N. Z. i. 185. Stems slender, glabrous, twining, sometimes tubereled. Leaves 5-foliate; leaflets  $\frac{1}{3}$ – $1\frac{1}{2}$  in. long, sessile, lanceolate, acuminate, quite entire, the outer sometimes 2-lobed. Peduncles 1–3-flowered. Flowers drooping, large, rose-coloured. Sepals obtuse. Corolla 1–3 in. diam. Seeds silky.—*Convolvulus mucronatus*, Forst.

**Northern Island**: east coast, *Banks and Solander*; Bay of Islands, *Cunningham*; Cavalhos Island, *Colenso*. An Australian, Pacific island, and Indian plant, probably the same as *I. palmata*, Forst.

### 3. DICHONDRA, Forst.

Prostrate herb. Flower solitary, axillary, small.—Calyx 5-partite. Corolla nearly rotate, 5-lobed, imbricate. Ovary of 2 distinct carpels; styles 2, distinct, stigmas capitate; ovule 1 in each carpel, erect. Capsule membranous, indehiscent, 1-seeded.

1. **D. repens**, *Forst.*;—*Fl. N. Z.* i. 185. A small, procumbent, branched, creeping, tufted, silky herb. Leaves petiolate, reniform,  $\frac{1}{2}$ –1 in. broad, entire or emarginate at the tip. Flowers small, yellow. Corolla shorter than the calyx.

Abundant throughout the islands, *Banks and Solander*, etc. A very common tropical plant in both hemispheres; also found in Tasmania, Australia, and the warmer regions of America.

### 4. CUSCUTA, Linn.

Leafless, rootless, slender, twining, parasitical herbs, adhering by small lateral suckers to herbs or shrubs, which they derive their nutriment from, and eventually strangle. Flowers white yellow or pink, marked with transparent oil-glands, small, clustered or racemose.—Calyx 5-lobed. Corolla ovoid globular or ureolate. Stamens very short, inserted at the union of the lobes of the corolla, with as many scales below them. Ovary 2-celled; styles 2, stigmas capitate; cells 2-ovuled. Capsule membranous, 2-celled, 2-seeded, dehiscing transversely at the base. Seeds albuminous; embryo terete curved or spiral; cotyledons 0.

A considerable genus, found in Europe and many tropical and temperate parts of the globe: it resembles *Cassytha* in habit; and some species (Dodders) are pests in clover-fields and other crops in England.

1. **C. densiflora**, *Hook. f. Fl. N. Z.* i. 186. Stems slender, matted and twisting together, as thick as stout thread. Flowers crowded into very short 6–10-flowered racemes. Calyx-lobes short, oblong, obtuse. Corolla  $\frac{1}{4}$  in. long, bell-shaped; lobes short, rounded, recurved. Scales oblong, fimbriated, united at their bases by a thin membrane. Filaments longer than the anthers; styles rather long.

**Middle Island**: Port Underwood, *Lyall*. Dr. Engelmann, who has examined all the *Cuscutæ* of the Hookerian Herbarium, observes of this that it hardly differs from the South Brazilian *C. racemosa*, Martius; but according to the descriptions of that plant, the corolla-lobes are erect and acute, and the filaments and style much shorter.

## ORDER LII. SOLANÆÆ.

Herbs shrubs or trees. Leaves alternate, exstipulate. Flowers usually in cymes, regular or irregular, hermaphrodite.—Calyx usually 5-lobed, inferior. Corolla 5-lobed, folded in bud. Stamens inserted on the corolla, alternating with the lobes; anthers free or cohering, opening by slits or pores. Ovary superior, 2-celled; style simple, stigma entire or lobed; ovules numerous, on placentas attached to the axis. Fruit a berry (rarely capsular) indehiscent, several-seeded; albumen copious, fleshy; embryo usually curved or spiral.

A very extensive Natural Order, abounding in all temperate and hot latitudes.

## 1. SOLANUM, Linn.

Herbs shrubs or small trees. Flowers regular.—Calyx 4- or 5-cleft. Corolla rotate or bell-shaped, 4- or 5-fid, with plaited æstivation. Stamens 4 or 5, equal or unequal, filaments short; anthers linear, free or conniving, opening by 2 terminal pores. Style simple, stigma obtuse; ovules very numerous. Berry oblong or globose, 2-celled, cells many-seeded. Seeds flattened or reniform; embryo curved.

A very large genus, found in all temperate and tropical parts of the world, absent in the coldest.

Tall and stout. Flowers  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., blue or purple. Anthers spreading 1. *S. aviculare*. Slender. Flowers  $\frac{1}{4}$  in. diam., whitish. Anthers connivent . . . . 2. *S. nigrum*.

1. ***S. aviculare***, *Forst.*;—*Fl. N. Z.* i. 182. Stem tall, herbaceous, glabrous, angled, shrubby at the base, branched, leafy. Leaves very variable, 4–10 in. long, lanceolate or oblong, entire or variously lobed or pinnatifid, membranous, glabrous, veins divaricating at right angles. Flowers in axillary or supra-axillary 3–10-flowered cymes, large, purplish or bluish. Calyx-lobes short, obtuse. Anthers spreading. Berry ovoid, edible.—*S. laciniatum*, Aiton; Bot. Mag. t. 349.

Throughout the islands, common in woods, *Banks* and *Solander*, etc. Also found in Norfolk Island, in Southern Australia, and Tasmania. The spreading anthers are unusual in the genus.

2. ***S. nigrum***, *Linn.*;—*Fl. N. Z.* i. 182. Stems slender, branched, glabrous, 1–3 ft. high. Leaves petioled, 1–4 in. long, ovate, acuminate, rarely sinuate or lobed. Flowers  $\frac{1}{4}$ – $\frac{1}{3}$  in. diam., umbelled, umbels on long supra-axillary peduncles. Berry  $\frac{1}{4}$ – $\frac{1}{3}$  in. diam., globose, black or red.

Abundant in waste places near houses, etc., throughout the islands. One of the commonest weeds in the world.

The “Cape Gooseberry,” *Physalis peruviana*, Linn., is naturalized in the northern districts of New Zealand. The Potato, Capsicum, and Tomato also occur as escapes from cultivation.

## ORDER LIII. SCROPHULARINÆÆ.

Herbs, shrubs, or small trees. Leaves opposite, (except *Pygmæa*) exstipulate. Flowers axillary or in terminal racemes cymes or panicles, irre-



gular, rarely regular, hermaphrodite.—Sepals 5, free or variously cohering, inferior, very rarely half-superior, persistent. Corolla regular or 2-lipped, imbricate in bud. Stamens 2 or 4, with sometimes a rudimentary fifth between the upper corolla-lobes. Ovary 2-celled; style simple, stigma simple or 2-lobed, or of 2 plates; ovules numerous in each cell. Capsule 2-celled, many-seeded. Seeds albuminous.

One of the most extensive Natural Orders, found in all quarters of the globe. The New Zealand genus *Pygmæa*, of which I have seen no fruit, is a doubtful member of the Order; unlike its co-ordinates, the leaves appear to be imbricated all round the stem, and not opposite.

*Stamens 2.*

- |  |                 |
|--|-----------------|
| Calyx 4-partite. Corolla with 2 inflated lips. Stigma subcapitate . . . . .                            | 1. CALCEOLARIA. |
| Calyx 5-partite. Corolla 2-lipped. Stigma 2-lamellate . . . . .  | 4. GRATIOLA.    |
| Calyx 4- or 5-partite. Corolla 4- or 5-lobed. Stigma subcapitate. Leaves opposite . . . . .            | 7. VERONICA.    |
| Calyx 5- or 6-partite. Corolla 5- or 6-lobed. Stigma subcapitate. Leaves imbricate, alternate. . . . . | 8. PYGMÆA.      |

*Stamens 4.*

- |  |                  |
|--|------------------|
| Calyx 5-toothed. Corolla 2-lipped, tumid at throat. Stigma 2-lamellate . . . . .   | 2. MIMULUS.      |
| Calyx 5-lobed. Corolla 2-lipped, not tumid at throat. Stigma 2-lamellate . . . . . | 3. MAZUS.        |
| Calyx 3-5-lobed. Corolla minute. Anther 1-celled. Stigma spathulate. . . . .       | 5. GLOSSOSTIGMA. |
| Calyx 5-toothed. Corolla minute, rotate. Anther 1-celled. Stigma clavate. . . . .  | 6. LIMOSELLA.    |
| Calyx 5-partite. Corolla 5-lobed. Stigma capitate . . . . .                        | 9. OURISIA.      |
| Calyx 4-lobed or -toothed. Corolla 2-lipped. Stigma dilated . . . . .              | 10. EUPHRASIA.   |

### 1. CALCEOLARIA, Linn.

Herbs. Leaves radical and cauline. Flowers in axillary or terminal racemes.—Calyx 4-partite, inferior or half-superior. Corolla-tube very short; limb 2-lipped; lips nearly equal and both inflated in the New Zealand species, the upper small and lower very large and inflated in the American ones. Stamens 2; anthers 2-celled. Ovary 2-celled; style simple, stigma subcapitate; ovules numerous, placentas on the septum. Capsule ovoid, septical, 2-valved; valves 2-fid. Seeds numerous, striate.

A very large South American and especially Andean genus, of which the only extra American species are the New Zealand ones, which belong to a section (*Jovellana*), having the two lips of the corolla nearly equal.

Stem erect. Leaves oblong, 2-4 in. long. Calyx inferior . . . . . 1. *C. Sinclairii*.  
 Stem creeping. Leaves ovate,  $\frac{3}{4}$ - $\frac{3}{2}$  in. long. Calyx half-superior. . . . . 2. *C. repens*.

1. ***C. Sinclairii*, Hook. Ic. Pl. t. 561;—Fl. N. Z. i. 187.** An erect, slender, glandular, pubescent herb, 6-18 in. high. Leaves with slender petioles, 2-4 in. long, oblong, coarsely-toothed or lobulate, the lobes again toothed, very membranous, sometimes cordate at the base. Panicle branched. Calyx-lobes ovate, obtuse or acute. Corolla downy,  $\frac{1}{3}$  in. diam., yellow? spotted with purple. Capsule  $\frac{1}{6}$  in. long.

**Northern Island:** East Cape, *Sinclair*; Hawke's Bay, *Colenso*. Very closely allied to the Chilean *C. punctata*, but differing a little in foliage, and in the corolla apparently yellow, not purple.

2. **C. repens**, *Hook. f. Fl. N. Z.* i. 187. A very slender, branched, creeping, pubescent herb. Leaves with slender petioles,  $\frac{1}{3}$ – $\frac{3}{4}$  in. long, orbicular, broadly ovate-oblong or ovate-cordate, irregularly and unequally doubly-toothed or crenate, very membranous. Panicles very few-flowered. Flowers  $\frac{1}{4}$  in. across. Calyx half-superior.

**Northern** Island: ravines and forests at the base of the Ruahine range, *Colenso*.

## 2. MIMULUS, Linn.

Erect or creeping herbs. Flowers solitary and axillary in the New Zealand species.—Calyx tubular or short, terete or 5-angled, 5-toothed or -lobed. Corolla campanulate, 2-lipped; upper lip erect or reflexed, 2-lobed; lower 3-lobed, usually with 2 protuberances at the throat, lobes all flat. Stamens 4; anther-cells diverging, finally confluent. Stigma 2-lamellate. Capsule loculicidal, 2-valved; valves separating from the placentas.

A considerable genus, found in various parts of the world, but not in Europe, except as an introduced plant.

Glabrous. Leaves sessile . . . . . 1. *M. repens*.  
More or less pilose. Leaves petiolate . . . . . 2. *M. radicans*.

1. **M. repens**, *Br.*;—*Fl. N. Z.* i. 188. A small, creeping, succulent, perfectly glabrous herb; stems branched, 1–5 in. long. Leaves  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, oblong or broadly ovate, sessile or stem-clasping, quite entire. Peduncle axillary, 1-flowered, longer or shorter than the leaves. Calyx variable in form, from obconic to hemispherical; lobes obscure. Corolla large,  $\frac{1}{2}$  in. across, pale-blue with yellow throat.—*Bot. Mag. t.* 5423.

**Northern** and **Middle** Islands: not rare in muddy places, bogs, etc., *Banks and Solander*, etc. Also a common Tasmanian and South-Eastern Australian plant.

2. **M. radicans**, *Hook. f. Fl. N. Z.* i. 188. Stem creeping and rooting, with short, leafy branches. Leaves spreading, close together,  $\frac{1}{4}$ –1 in. long, petiolate, obovate, obtuse, quite entire, glabrous or pilose. Peduncle stout, erect, longer or shorter than the leaf, 1- or 2-flowered, with a subulate bract in the middle or at the fork. Calyx 5-cleft, pilose. Corolla large,  $\frac{1}{2}$ – $\frac{3}{4}$  in. broad.

**Northern** Island: Tararua mountains and Wairarapa valley, *Colenso*. **Middle** Island: common in swampy places, ascending to 1200 ft., from Nelson, *Munro*, etc., to Otago, *Lindsay*.

## 3. MAZUS, Loureiro.

Herbs. Leaves opposite or fascicled. Flowers in terminal, leafless racemes, or solitary.—Calyx bell-shaped, 5-fid. Corolla: upper lip 2-fid; lower larger, 3-fid, with two protuberances at the throat. Stamens 4; anther-cells diverging. Stigma equally 2-lamellate. Capsule globose or compressed, loculicidal, 2-valved; valves entire, separating from the placentas.

A small Indian, Chinese, and Australian genus.

1. **M. Pumilio**, *Br.*;—*Fl. N. Z.* i. 189. Stem creeping underground, sending out very short, leafy branches. Leaves fascicled, spreading,  $\frac{1}{2}$ –2 in. long, petioled, narrow obovate-spathulate, obtuse, nearly entire or lobulate, membranous, glabrous or sparingly pilose. Scape slender, 1–6-flowered.

Flowers on slender, curved pedicels, with a subulate bract at the base or middle. Corolla blue,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam.—Hook. Ic. Pl. t. 567.

**Northern** and **Middle** Islands, *Banks and Solander*, etc.: common as far south as Canterbury. Also common in South-Eastern Australia and Tasmania.

#### 4. GRATIOLOA, Linn.

Erect or creeping herbs. Leaves small, usually sessile. Peduncles axillary, 1-flowered.—Calyx 5-partite. Corolla: upper lip entire or shortly 2-fid; lower 3-fid; throat without protuberances. Stamens 2 fertile, and 2 reduced to filaments; anther-cells distinct, parallel. Stigma inflated or 2-lamellate. Capsule 4-valved; valves falling away from the placentas. Seeds numerous, small.

A considerable tropical and subtropical genus, scattered over the world, rare in temperate regions though found in Europe.

Leaves  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, glabrous, toothed . . . . . 1. *G. sexdentata*.  
Leaves  $\frac{1}{5}$ – $\frac{1}{4}$  in. long, glabrous or puberulous, obtusely toothed . . . . . 2. *G. nana*.

1. *G. sexdentata*, *A. Cunn.*;—*Fl. N. Z.* i. 189. Stems stout, ascending or suberect, 6–18 in. long, glabrous. Leaves  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, sessile, oblong, subacute, with scattered teeth. Peduncles very short. Flowers  $\frac{1}{3}$  in. long, yellow. Anthers 2-celled, one cell sometimes empty; sterile filaments elongated.

**Northern** Island: marshy places, not uncommon, *Banks and Solander*, etc., probably overlooked in the Middle Island. Also found in South-Eastern Australia and Tasmania; and most closely allied to the South American *G. peruviana*.

2. *G. nana*, *Benth.*;—*Fl. N. Z.* i. 189. Stems short, matted, creeping, and as well as the leaves, glabrous or puberulous. Leaves  $\frac{1}{5}$ – $\frac{1}{4}$  in. long, oblong, obtuse, obtusely-toothed. Peduncles very short. Flowers as in *G. sexdentata*.

**Northern** Island: Bay of Islands, *R. Cunningham*, and elsewhere probably common but overlooked. **Middle** Island: Kowai valley, *Haast*. Much smaller than *G. sexdentata*. Flowers white or pinkish. Also found on the alps of Tasmania. Very like *Mimulus repens*, in general appearance.

*Herpestes cuneifolia*, Spr., is introduced into Raoul's catalogue of New Zealand plants, no doubt by mistake for a *Gratiola*, or for *Mimulus repens*, which it closely resembles.

#### 5. GLOSSOSTIGMA, Arnott.

Minute, tufted, creeping herbs. Peduncles axillary, 1-flowered.—Calyx bell-shaped, 3–5-lobed. Corolla most minute, upper lip 2-lobed, lower 3-lobed. Stamens 2–4; anthers 1-celled, exserted. Stigma large, dilated, spatulate. Capsule subglobose, loculicidal, 2-valved; valves separating from the placentas.

Minute Indian, African, and Australian herbs.

1. *G. elatinoides*, *Benth.*;—*Fl. N. Z.* i. 189. Glabrous. Stems rooting at the nodes, 1–2 in. long. Leaves petioled, spatulate,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, quite entire, obtuse. Peduncles shorter than the leaves. Flowers  $\frac{1}{12}$  in. long. Stamens 4; anthers peltate, exserted.—*Tricholoma elatinoides*, *Benth.*; *Lobelia submersa*, *A. Cunn.*

**Northern** Island: common in wet places, *A. Cunningham*, etc.

## 6. LIMOSELLA, Linn.

Small, tufted, marsh or water plants. Leaves linear or linear-spathulate. Peduncles axillary, 1-flowered. Flowers minute.—Calyx campanulate, 5-toothed. Corolla rotate; limb 5-fid; segments unequal. Stamens 4; anthers 1-celled, included. Stigma subclavate. Capsule subglobose, 2-valved; valves entire, separating from the placenta.

A small genus of plants found in all parts of the globe, probably all the species enumerated in books are varieties of one.

1. *L. aquatica*, var. *tenuifolia*, Linn.;—*Fl. N. Z.* i. 190. Leaves  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, obtuse. Peduncles solitary or several together. Flowers white,  $\frac{1}{12}$  in. across or less.—*L. australis*, Br.; *L. tenuifolia*, Nuttall.

Throughout the islands, common in wet places. A widely distributed plant in the temperate and cold regions of both hemispheres and tropical mountains.

## 7. VERONICA, Linn.

Herbs or shrubs, rarely small trees. Leaves very various, opposite, often connate at the base, small and 'scale-like or large, sometimes minute and most densely imbricating quadrifuriously. Flowers small, usually in axillary racemes, sometimes spiked corymbose or paniced, rarely solitary.—Sepals 4, rarely 5 (one being 2-fid or 2-partite). Corolla with a short or long tube, and expanded 4- rarely 5-lobed limb; lobes unequal. Stamens 2, filaments long or short, inserted at the throat of the corolla. Ovary small, compressed, 2-celled; style slender, stigma capitate; ovules numerous. Capsule 2-celled, ovoid orbicular or didymous, dorsally or laterally compressed, septicidally dehiscent; valves often splitting longitudinally, falling away from the seed-bearing septum. Seeds numerous or few.

A very large European, Oriental, and New Zealand genus, comparatively rare in other parts of the globe. In New Zealand it forms a more conspicuous feature of the vegetation than in any other country, both from the number, beauty, and ubiquity of the species, from so many forming large bushes, and from the remarkable forms the genus presents. The species are excessively difficult of discrimination, present numerous intermediate forms between many most distinct-looking ones, vary extremely in all their organs and hybridize most freely; many probably are, if not bisexual, still partially so, the two sexes presenting differences in the size of the stamens and calyx and capsules, a point worthy of the close attention of the colonist.

Between the first 19 species it is most difficult to draw any contrasting specific characters, they appear to present a graduated scale of forms. *V. elliptica* alone, I find it impossible to confound with any other which is the more remarkable, as it is the only New Zealand shrubby species that extends beyond the islands, and inhabits South Chili, etc.; yet, except for the large size of the white flower and large fruit, it is difficult to point out any character of importance to distinguish it from forms of several others.

Of the curious species of section 4 (viz. 20 to 25), all seem very distinct and well marked; though intermediates are quite conceivable, and may be found, it would be instructive to know if they will hybridize together and with the other sections.

Section 5 also presents a most remarkable form of the genus, quite new, and peculiar to New Zealand; the two species it includes seem distinct.

Of the 5 species in section 6, *V. macrantha* and *Benthani* are very distinct, and the latter a most beautiful and remarkable plant; the three others are more closely allied, but I think distinct.



In section 7, *V. linifolia* and *Anagallis* are very different from one another and any others; 34 to 37 are probably all forms of one plant, as is perhaps *V. spathulata* of *V. elongata*.

So many new species of this genus (19) have been found since the publication of the 'Flora Novæ-Zelandiæ,' that probably many more will reward the researches of collectors; on the other hand, no doubt some of the species here described will be reduced by future observers.

In the following Conspectus I have had regard to *prevalent* prominent differences only; there is not an organ that does not vary conspicuously in every species, and I regret to add that I have been obliged to neglect sundry specimens from inability to refer them exactly to any species. In such a genus as this, characters must be arbitrarily adopted, and be regarded as provisional only.

I. Capsule dorsally compressed, ovoid, turgid; valves 2-fid at the tip.

A. Leaves quite entire (rarely toothed in *V. Haastii*).

§ 1. Large shrubs. Leaves oblong or obovate 1-4 in. long, obtuse or subacute. Racemes simple, short, stout, many-flowered.

- Leaves 2-4  $\times$  1  $\frac{1}{2}$  in., obovate. Stamens stout. Capsule  $\frac{1}{4}$  in. . . . . 1. *V. speciosa*.  
 Leaves 3  $\times$  1 in., linear-oblong. Stamens slender. Capsule  $\frac{1}{4}$  in. . . . . 2. *V. Dieffenbachii*.  
 Leaves 1-2  $\times$   $\frac{1}{2}$ -1 in., obovate-oblong, subacute. Stamens slender.  
 Capsule  $\frac{1}{8}$  in. . . . . 3. *V. macroua*.

§ 2. Large shrubs. Leaves linear or lanceolate, 2-6 in. long. Racemes simple, long, slender, very many-flowered.

- Leaves 2-6 in. Capsule  $\frac{1}{2}$  in., scarcely longer than sepals . . . . . 4. *V. salicifolia*.  
 Leaves 3-6 in. Capsule  $\frac{1}{4}$  in., 2 or 3 times as long as sepals . . . . . 5. *V. macrocarpa*.  
 Leaves 1-3 in. Capsule a little longer than the small, obtuse sepals . . . . . 6. *V. parviflora*.  
 Leaves 1-3 in. Capsule  $\frac{1}{4}$  in., 2 or 3 times as long as the lanceolate sepals . . . . . 7. *V. ligustrifolia*.  
 Leaves 1-2 in., hairy on both surfaces . . . . . 8. *V. pubescens*.

§ 3. Large or small, erect shrubs. Leaves  $\frac{1}{2}$ -1 in. long, coriaceous. Racemes or spikes peduncled, usually short, simple or corymbose, or collected into heads. Bracts usually small, large in 13 and 18.

a. Leaves lax, spreading, not imbricate. Branches even.

- Leaves  $\frac{3}{4}$ -1  $\times$   $\frac{1}{4}$ - $\frac{1}{2}$  in. Racemes long. Pedicels usually distinct . . . . . 9. *V. Traversii*.  
 Leaves  $\frac{1}{2}$ - $\frac{3}{4}$   $\times$   $\frac{1}{4}$ - $\frac{1}{2}$  in. Spikes attenuate. Pedicels 0 . . . . . 10. *V. vernicosa*.  
 Leaves  $\frac{1}{2}$ - $\frac{3}{4}$   $\times$   $\frac{1}{4}$ - $\frac{1}{2}$  in., petioled and apiculate. Branches hoary. Corolla  $\frac{1}{2}$ - $\frac{3}{4}$  in., white . . . . . 11. *V. elliptica*.  
 Leaves  $\frac{1}{2}$ - $\frac{3}{4}$   $\times$   $\frac{1}{2}$  in., keeled. Flowers corymbose. Pedicels slender . . . . . 12. *V. diosmaefolia*.  
 Leaves  $\frac{1}{2}$ -1  $\times$   $\frac{1}{4}$ - $\frac{1}{2}$  in., not keeled. Spikes short. Pedicels 0. Bracts large . . . . . 13. *V. Colensoi*.

B. Leaves excessively thick, concave, more or less imbricate, often closely. Branches with close-set transverse scars.

- Leaves  $\frac{1}{2}$ - $\frac{3}{4}$   $\times$   $\frac{1}{4}$ - $\frac{1}{2}$  in., keeled, not truncate nor cordate at base . . . . . 14. *V. laevis*.  
 Leaves  $\frac{1}{4}$ - $\frac{1}{2}$   $\times$   $\frac{1}{5}$ - $\frac{1}{4}$  in., keeled, subcordate at base . . . . . 15. *V. buxifolia*.  
 Leaves  $\frac{1}{2}$ - $\frac{3}{4}$   $\times$   $\frac{1}{4}$ - $\frac{1}{2}$  in., midrib obscure. Capsule ovate, acute, glabrous . . . . . 16. *V. carnosula*.  
 Leaves  $\frac{1}{6}$ - $\frac{1}{2}$   $\times$   $\frac{1}{8}$ - $\frac{1}{2}$  in., midrib obscure. Capsule broad, obtuse, pubescent . . . . . 17. *V. pinguisfolia*.  
 Leaves  $\frac{1}{6}$ - $\frac{1}{4}$  in. Spikes tomentose, distichous. Bracts large, concave . . . . . 18. *V. pimeleoides*.  
 Leaves  $\frac{1}{2}$ - $\frac{3}{4}$  in., orbicular, spreading and recurved. Spike tomentose, dense. Ovary villous . . . . . 19. *V. Buchanani*.

§ 4. Erect or decumbent shrubs. Leaves very minute, thick and short,  $\frac{1}{20}$ - $\frac{1}{12}$  in. long, densely 4-fariously imbricate, or in distant pairs. Flowers fascicled or capitate at the ends of the branches.

a. Leaves most densely imbricate, connate in pairs.

- Branches square,  $\frac{1}{12}$ - $\frac{1}{8}$  in. diam. Leaves black when dry, tumid, obtuse . . . . . 20. *V. tetragona*.

- Branches square,  $\frac{1}{8}$ – $\frac{1}{10}$  in. diam. Leaves brown when dry, abruptly acuminate . . . . . 21. *V. lycopodioides*.  
 Branches square,  $\frac{1}{12}$  in. diam. Leaves very broad, subacute, black when dry . . . . . 22. *V. tetrasticha*.  
 Branches terete. Leaves connate to middle, brown when dry . . . . . 23. *V. Hectori*.  
 Branches terete. Leaves truncate, yellowish when dry . . . . . 24. *V. saticornioides*.  
 β. Leaves in distant, opposite pairs . . . . . 25. *V. cupressoides*.  
 § 5. Small decumbent shrubs, with short flexuous branches, densely clothed with short, broad, rigid, densely imbricating leaves,  $\frac{1}{8}$ – $\frac{1}{2}$  in. long. Flowers in terminal, sessile, ovoid heads, continuous with the branches.  
 Leaves  $\frac{1}{8}$ – $\frac{1}{2}$  in., not keeled. Sepals not ciliate . . . . . 26. *V. Haastii*.  
 Leaves  $\frac{1}{8}$ – $\frac{1}{2}$  in., recurved, keeled. Sepals ciliate . . . . . 27. *V. epacridea*.  
 B (§ 6). Leaves more or less toothed or serrate. (See Haastii, in § 5.)  
 Glabrous. Flowers racemose,  $\frac{3}{4}$  in. diam. . . . . 28. *V. macrantha*.  
 Flowers sessile on branches of a loose panicle 3–10 in. long . . . . . 29. *V. Hulkeana*.  
 Flowers sessile, in short, spreading, puberulous panicles. Bracts acute . . . . . 30. *V. Luvaudiana*.  
 Flowers sessile, in dense oblong panicles. Bracts obtuse . . . . . 31. *V. Raoulia*.  
 Flowers indense, leafy racemes. Leaves edged with down . . . . . 32. *V. Benthami*.  
 II. (§ 7). Capsules laterally compressed, didymous.—Herbs with creeping, diffuse, slender stems (or erect in 40). Leaves serrate or toothed, except in *V. linifolia*. Flowers in slender, axillary, long-peduncled racemes (short in 38 and 39).  
 Leaves  $\frac{3}{8}$ –1 in., linear, obtuse, quite entire . . . . . 33. *V. linifolia*.  
 Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in., ovate, glabrous, serrate. Raceme glandular . . . . . 34. *V. nivatis*.  
 Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in., ovate or oblong, serrate, glabrous. Peduncle long . . . . . 35. *V. Lyallii*.  
 Leaves  $\frac{1}{2}$ – $\frac{3}{4}$  in., ovate or oblong, glabrous, with 1 or 2 teeth on each side. Peduncle long . . . . . 36. *V. Bidwillii*.  
 Leaves 1–5 in., oblong ovate or lanceolate, glabrous, deeply serrate . . . . . 37. *V. cataractæ*.  
 Leaves  $\frac{1}{2}$ –1 in., glabrous or pubescent, broad, ovate-cordate, coarsely toothed . . . . . 38. *V. elongata*.  
 Leaves  $\frac{1}{8}$ – $\frac{1}{2}$  in., glandular-pubescent, ovate-spathulate. Peduncles very short . . . . . 39. *V. spathulata*.  
 Erect glabrous. Leaves oblong, 1–2 in., crenate . . . . . 40. *V. Anagallis*.

1. ***V. speciosa***, *R. Cunn.*;—*Fl. N. Z.* i. 191. A glabrous stout shrub; branches angled, as thick as a goose-quill. Leaves sessile or with very short thick petioles, 2–4 in. long, 1–1½ broad, obovate-oblong, rounded at the tip, very coriaceous, shining, quite entire, downy on the midrib above, veins obsolete. Racemes dense-flowered, not longer than the leaves, 1 in. diam., stout, erect; pedicels short. Calyx-lobes oblong-ovate, subacute. Corolla deep blue-purple,  $\frac{1}{3}$  in. diam., lobes obtuse. Stamens and style very long and stout. Capsule  $\frac{1}{4}$  in. long, broadly ovate, thrice as long as the calyx.—*Bot. Mag.* t. 4057.

**Northern Island**: seacoast at Hokianga, *Cunningham*. **Middle Island**: Ship Cove and Port Nicholson, *Lyall*. I have a cultivated hybrid between this and *V. elliptica*, with leaves only 1½ in. long, and racemes 1 in. long, of blue flowers, raised by I. A. Henry, Esq., of Trinity, Edinburgh.

2. ***V. Dieffenbachii***, *Benth.*;—*Fl. N. Z.* i. 191. A stout glabrous shrub; branches terete, almost as stout as a quill. Leaves sessile by a subcordate base, 3 in. long, 1 broad, linear-oblong, acute, rather coriaceous, quite entire, downy on the edges towards the base. Raceme longer than the leaves,  $\frac{3}{4}$  in. diam., strict, glabrous; pedicels slender. Sepals small, ovate-

lanceolate, acute. Corolla  $\frac{1}{4}$  in. diam. Stamens and style slender. Capsule  $\frac{1}{4}$  in. long, broadly ovate, thrice as long as the calyx.

**Chatham** Island, *Dieffenbach*. I have seen but one specimen.

3. **V. macroura**, *Hook. f. Fl. N. Z.* i. 191. A glabrous shrub, 1-6 ft. high; branches terete, as stout as a crow-quill. Leaves narrowed into very short petioles, 1-2 in. long,  $\frac{1}{2}$ -1 broad, linear-oblong or slightly obovate, acute, glabrous. Racemes rather longer than the leaves, stout, slightly curved, dense-flowered,  $\frac{1}{2}$ -1 in. diam., puberulous or pubescent; pedicels slender. Sepals small, ovate, acute. Corolla  $\frac{1}{4}$ - $\frac{1}{3}$  in. diam.; tube rather long. Stamens and style slender. Capsules small,  $\frac{1}{8}$  in. long, most densely crowded, recurved, very little longer than the sepals.

**Northern** Island: East Cape, Wangarei, Cook's Straits, etc., *Colenso*. **Middle** Island: Tarndale, *Sinclair* (flowers  $\frac{1}{4}$  in. diam.).

4. **V. salicifolia**, *Forst. ;—Fl. N. Z.* i. 191. A large glabrous shrub; branches terete, as thick as a crow-quill. Leaves sessile, 2-6 in. long, linear-oblong-lanceolate, acuminate, quite entire, glabrous. Racemes much longer than the leaves, simple, very many-flowered, pubescent or glabrate; pedicels slender. Flowers extremely variable in size and length of tube of corolla, bluish-purple or white. Sepals oblong-lanceolate, obtuse, rarely acute, glabrous or pubescent. Corolla  $\frac{1}{3}$ - $\frac{1}{2}$  in. diam. Capsule  $\frac{1}{3}$  in. long, ovate, acute, not twice as long as the calyx.—*V. Lindleyana*, *Paxt. Mag. Bot.*; *V. stricta*, *Banks and Solander*.

Abundant throughout the islands, *Banks and Solander*, etc. The *V. Foukii*, Philippi, of Chili, is (no doubt) founded on cultivated specimens of the New Zealand plant, erroneously supposed to have been sent from Guayticas Archipelago. This species passes into *V. parviflora* by becoming smaller-leaved, and into *macrocarpa* by the fruit. Many varieties of this, and hybrids between it and *V. speciosa*, *macrocarpa*, and others, are extensively cultivated in England under various names (*Kermesina*, *Lindleyana*, and *Andersoni* of gardens, *versicolor* and *linariæfolia*, *Visiani*, etc. etc.).

5. **V. macrocarpa**, *Vahl ;—Fl. N. Z.* i. 192. Characters of *V. salicifolia*, but flowers usually larger, and capsule nearly  $\frac{1}{2}$  in. long, three times as long as the calyx.—*V. myrtifolia*, *Banks and Solander*; *V. salicifolia*, *A. Cunn. Herb.*

**Northern** and **Middle** Islands: not uncommon, Bay of Islands, *A. Cunningham*, etc.; Mount Egmont, *Dieffenbach*; Cook's Straits, *D'Urville*; Bay of Islands, *Logan*; Port William, *Lyall*. I have specimens of this from Lyall, gathered at Otago and Port William, with oblong-lanceolate leaves, 1 in. long, and short broad racemes 1-2 in. long, with very large flowers upwards of  $\frac{1}{2}$  in. diam. This species is too closely allied to *V. salicifolia*, and indeed differs materially in the capsule only.

6. **V. parviflora**, *Vahl ;—Fl. N. Z.* i. 192. A glabrous shrub, usually 4-6 ft. high. Leaves erect or spreading, 1-3 in. long, lanceolate oblong-lanceolate or linear-lanceolate, flat or concave and keeled, quite entire, acute or acuminate. Racemes generally strict, about twice as long as the leaves, dense-flowered, pubescent; pedicels short. Flowers small. Sepals small, ovate, obtuse, puberulous. Corolla  $\frac{1}{8}$ - $\frac{1}{6}$  in. diam. Capsule  $\frac{1}{8}$  in., a little longer than the calyx.—*V. angustifolia*, *A. Rich.*; *V. stenophylla*, *Steud.*

**Northern** and **Middle** Islands: abundant. This seems to be a small-leaved form of *V. salicifolia*. Specimens with more oblong obtuser leaves almost pass into *V. macroura*.

Vahl describes the capsule as twice as long as the calyx ; it is rarely so long in my specimens but it is variable in this respect, passing thus into *V. ligustrifolia*, as *V. salicifolia* does into *V. macrocarpa*, and *V. macrocarpa* into *V. Dieffenbachii*. Colenso sends specimens from Cook's Straits with very narrow leaves, and fruit as large as in *V. ligustrifolia*.

7. ***V. ligustrifolia***, *A. Cunn.* ;—*Fl. N. Z.* i. 192. A large glabrous diffusely-branched shrub. Leaves  $1\frac{1}{2}$ –3 in. long, usually very narrow linear-lanceolate, acuminate,  $\frac{1}{8}$ – $\frac{1}{4}$  in. broad, flat or concave and keeled at the back, quite entire, sometimes broader,  $\frac{1}{2}$ – $\frac{3}{4}$  in. and more, obtuse. Racemes about twice as long as the leaves, rather slender, lax-flowered, puberulous ; pedicels slender, often  $\frac{1}{6}$ – $\frac{1}{4}$  in. long. Flowers rather large. Sepals lanceolate, acuminate. Corolla  $\frac{1}{4}$  in. across. Capsule nearly  $\frac{1}{4}$  in. long, twice or thrice as long as the calyx.—*V. angustifolia*, *A. Cunn.* not *A. Rich.* ; *V. acutiflora*, *Benth.*

**Northern Island** : abundant at Bay of Islands, near the falls of the Keri Keri and elsewhere. **Middle Island** : Otago and Port William, *Lyall*. **Kermadec Island**, *M'Gillivray*. This is probably a small-leaved form of *V. macrocarpa* : it differs from *V. parviflora* in the usually larger flowers, acuminate lanceolate sepals, and larger capsule.

8. ***V. pubescens***, *Banks and Solander* ;—*Fl. N. Z.* i. 193. A shrub, 6 ft. high, covered everywhere with (when dry) red-brown hairs. Leaves 1–2 in. long, oblong-lanceolate, entire. Racemes many-flowered. Sepals oblong-lanceolate, acuminate, pubescent. Capsule twice as long as the calyx.

**Northern Island** : Oporagi, in woods. A remarkable plant, of which I have seen no specimens but the Banksian.

9. ***V. Traversii***, *Hook. f., n. sp.* A small glabrous shrub ; branches terete. Leaves spreading, sessile,  $\frac{3}{4}$ –1 in. long,  $\frac{1}{6}$ – $\frac{1}{3}$  broad, obovate or linear-oblong, acute or obtuse, entire, coriaceous, flat ; midrib strong. Racemes longer than the leaves, subterminal, 1–2 in. long, many-flowered, puberulous ; pedicels distinct, slender or reduced to 0 ; bracts very small. Sepals  $\frac{1}{16}$  in. long, ovate, obtuse or subacute, ciliate, 2–5 times shorter than the cylindric corolla-tube. Corolla-tube long or short ; lobes  $\frac{1}{4}$  in. diam. Capsule  $\frac{1}{8}$  in. long, oblong, acute, 3 or 4 times longer than the calyx.

**Middle Island** : hills near Canterbury and abundantly in river beds, *Travers* ; Southern Alps, abundant, ascending to 4000 ft., *Haast* ; Otago, abundant in the lake district, *Hector and Buchanan*. Allied to *V. parviflora*, of which it has the calyx, whilst the fruit is like that of *V. ligustrifolia*. Mr. Travers sends an instructive series of specimens, showing the passage from long to no pedicels, and from long to very short corolla.

10. ***V. vernicosa***, *Hook. f., n. sp.* A small stout glabrous shrub. Leaves close-set, spreading, petioled,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long,  $\frac{1}{4}$ – $\frac{1}{3}$  broad, obovate-oblong, obtuse or apiculate, varnished on the upper surface, entire, flat or a little concave ; midrib evident. Racemes crowded at the ends of the branches, puberulous, 1–1 $\frac{1}{2}$  in. long, often peduncled, tapering or caudate ; pedicels 0 or very short ; bracts very small. Sepals  $\frac{1}{16}$  in. long, oblong, obtuse. Corolla-tube very short ; limb  $\frac{1}{6}$ – $\frac{1}{4}$  in. diam. Capsules pedicelled, ovoid,  $\frac{1}{8}$  in. long, twice as long as the calyx.

**Middle Island** : common, Canterbury hills, alt. 1200 ft., *Travers* ; Upper Wairau, *Munro* ; Southern Alps, alt. 1500–3000 ft., *Haast* ; Nelson mountains, *Rough* (flower very large) ; Otago, Dun mountains, 3900 ft., *Lindsay*. A very pretty and distinct-looking plant, remarkable for the numerous spreading, broad, short, varnished leaves, and much attenuated racemes of nearly sessile flowers.



11. **V. elliptica**, *Forst.*;—*Fl. N. Z.* i. 193. A bushy large shrub or small tree, 5–20 ft. high; branches stout, hoary all round or in 2 lines, Leaves close-set, spreading, uniform, petiolate,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long,  $\frac{1}{4}$ – $\frac{1}{3}$  broad, linear-oblong or obovate-oblong, more or less truncate at the base, entire, flat, coriaceous, not shining; midrib strong, produced at the tip. Racemes very short, few-flowered, forming together a loose subcorymbose head at the ends of the branches, glabrous; pedicels distinct; bracts small, lanceolate. Sepals large,  $\frac{1}{3}$  in. long, ovate, acuminate. Corolla large, white; tube short; limb  $\frac{1}{3}$ – $\frac{2}{3}$  in. broad. Capsule  $\frac{1}{4}$  in. long, turgid, twice as long as the calyx.—*V. decussata*, Aiton; Bot. Mag. t. 242; *V. Menziesii*, Benth.

**Middle Island**: Dusky Bay, *Forster*; Canterbury, *Haast*; Otago, abundant by the sea. **Lord Auckland's** group and **Campbell's** Island, frequent, *J. D. H.* Also found in South Chili, Fuegia, and the Falkland Islands. A very handsome and most distinct species, easily recognized by its oblong, spreading, apiculate, petioled leaves, and large white subcorymbose flowers.

12. **V. diosmæfolia**, *R. Cunn.*;—*Fl. N. Z.* i. 193. A glabrous shrub, 3–12 ft. high; branches rather slender. Leaves petioled, close-set, spreading, rigidly coriaceous,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long,  $\frac{1}{6}$  broad, linear-oblong, acute at both ends, entire, not shining, sharply keeled by the midrib below. Corymbs terminal, depressed, many-flowered; pedicels slender; bracts lanceolate, acuminate. Sepals small,  $\frac{1}{10}$ – $\frac{1}{20}$  in. long, ovate, obtuse or acute, glabrous. Corolla-tube short; limb  $\frac{1}{8}$ – $\frac{1}{4}$  in. across. Capsule twice as long as the calyx.

**Northern Island**: Bay of Islands and Hokianga, *Cunningham*, *Edgerly*, *Colenso*, etc. A very distinct species, known by its fascicled branches, narrow rigid acute patent leaves, and small truly corymbose flowers.

13. **V. Colensoi**, *Hook. f.*—*V. Menziesii*, Benth. in part; *Fl. N. Z.* i. 193. A small glabrous shrub. Leaves patent or erecto-patent, almost sessile,  $\frac{1}{2}$ –1 in. long,  $\frac{1}{4}$ – $\frac{1}{3}$  in. broad, very coriaceous, linear-oblong, or narrow oblong-obovate, acute, entire, narrowed into the petiole, flat, not keeled, opaque, sometimes glaucous; midrib distinct, excurrent. Racemes subterminal, often compound, short, peduncled, hardly longer than the leaves, puberulous; pedicels very short or 0; bracts as long as the sepals, coriaceous. Sepals ovate-oblong, obtuse or subacute,  $\frac{1}{12}$  in. long. Corolla white pink or bluish; tube short; limb  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam. Capsule  $\frac{1}{8}$  in., twice as long as the calyx.

**Northern Island**: Ruahine mountains, *Colenso* (racemes simple, leaves glaucous). **Middle Island**: Nelson mountains, *Bidwill*; Tarndale, *Sinclair*; Southern Alps, abundant, *Haast*; ascending to 4000 ft., Wairau valley, and 3–5000 ft., *Travers*; Rotaiti Lake, *Munro* (midrib nearly obsolete, and leaves most coriaceous). A very variable plant, difficult in some states to distinguish from *V. lævis* and *V. Traversii*; best characterized by the sessile flowers, large coriaceous bracts, and subcorymbose inflorescence.

14. **V. lævis**, *Benth.*; *Fl. N. Z.* i. 194. A small stout glabrous shrub, 2–4 ft. high. Leaves erect and appressed and imbricating, rarely patent,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long,  $\frac{1}{4}$ – $\frac{1}{3}$  broad, broadly obovate-oblong, obtuse or acute, extremely coriaceous, entire, concave, sharply keeled by the stout prominent midrib, narrowed rather suddenly into the very stout, short petiole. Racemes short, twice as long as the leaves, usually crowded at the ends of the branches, puberulous; pedicels short; bracts short, coriaceous. Sepals  $\frac{1}{16}$  in. long, oblong-ovate, obtuse. Corolla-tube short; lobes  $\frac{1}{4}$  in. across. Capsule not seen.

**Northern Island:** Tongariro, *Bidwill*; Ruahine range, *Colenso*. **Middle Island:** Nelson mountains, *Bidwill*, alt. 2-6000 ft. In its normal state well marked by the small, concave, acute, very coriaceous, keeled leaves, not truncate at the base; but it passes into *V. buxifolia*, which has truncate bases, and into *V. carnosula*.

15. ***V. buxifolia*, Benth.**;—*Fl. N. Z.* i. 194. A small stout glabrous shrub, 2-3 ft. high, very closely allied to *V. laevis*, but the leaves are closely imbricated and cordate at the base. Leaves  $\frac{1}{4}$ – $\frac{1}{3}$  in. long,  $\frac{1}{8}$ – $\frac{1}{4}$  broad, broadly oblong-obovate, obtuse, suddenly truncate or cordate at the very short thick petiole, excessively thick and coriaceous, concave, keeled by the prominent midrib, usually polished. Racemes very short, dense-flowered, crowded at the ends of the branches and subcapitate, puberulous or glabrous; pedicels short; bracts as large as the sepals. Sepals oblong, obtuse. Corolla-tube short; limb  $\frac{1}{4}$ – $\frac{1}{3}$  in. across. Capsule  $\frac{1}{8}$  in. long, twice as long as the calyx. —*V. odora*, *Fl. Antarct.* 62, t. 41.

**Northern Island:** Tongariro?, *Dieffenbach*; Ruahine range, *Colenso*. **Middle Island:** abundant on the alps, Nelson, *Bidwill*; Wairau mountains, alt. 4-5500 ft., *Travers*; Southern Alps, ascending to 4000 ft., *Sinclair* and *Haast*; Hopkins river, alt. 3000 ft., *Haast* (with spreading leaves); Otago, subalpine, in the lake district, *Hector* and *Buchanan*. **Lord Auckland's Island, *J. D. H.* Usually a very distinct form, best distinguished by the closely imbricate, small, concave, keeled leaves, truncate or cordate at the base, and the crowded terminal inflorescence.**

16. ***V. carnosula*, Hook. f., n. sp.** A small, often prostrate, glaucous, stout shrub; branches covered with transverse scars, pubescent towards the tips. Leaves closely imbricate, suberect,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, broadly obovate or oblong or orbicular, round at the tip, entire, concave, extremely thick and coriaceous, almost sessile or suddenly contracted to the extremely broad thick petiole, not keeled, midrib very obscure or 0. Spikes short, pilose and pubescent, crowded together and forming heads at the ends of the branches, very dense-flowered; pedicels 0; bracts coriaceous, as long as the calyx. Sepals ovate, obtuse, scarcely ciliate. Corolla-tube very short; limb  $\frac{1}{4}$ – $\frac{1}{3}$  in. diam. Capsules  $\frac{1}{6}$  in., ovate, acute, glabrous, twice as long as the calyx. —*V. laevis*, *β. carnosula*, *Fl. N. Z.* i. 194.

**Middle Island:** Nelson, Morse's Mountain, 5000 ft., *Bidwill*; upper Wairau, *Munro*. The glaucous habit, broader, obtuse, excessively thick, concave leaves, without keel, distinguish this at once from *V. laevis*; from *V. pinguifolia* the ovary and capsules alone distinguish it.

17. ***V. pinguifolia*, Hook. f., n. sp.** A small, erect or decumbent, glaucous, robust shrub, 4 in. to 4 ft. high; branches pubescent above, covered with close-set transverse scars. Leaves sessile, erecto-patent, imbricate,  $\frac{1}{6}$ – $\frac{1}{2}$  in. long,  $\frac{1}{8}$ – $\frac{1}{2}$  broad, obovate-oblong, obtuse, entire, excessively thick and coriaceous, concave, not keeled; midrib very obscure. Spikes very short, longer than the leaves, pilose and pubescent, crowded into heads at the tops of the branches, very dense-flowered; pedicels 0; bracts coriaceous, as large as the sepals, ciliated. Sepals oblong, obtuse, ciliate and puberulous. Capsule obovate-oblong, obtuse, rounded or emarginate, pubescent, not much longer than the calyx.

**Middle Island:** common on the mountains of Nelson and Canterbury, Wairau gorge, alt. 3-5000 ft., *Travers*; Southern Alps, common, ascending to 5000 ft., *Haast*. The small size, robust habit, glaucous obtuse imbricate excessively thick small leaves without midrib,

short dense spikes crowded into a head, distinguish this from all except *V. carnosula*, which has very different capsules.

18. **V. pimeleoides**, *Hook. f. Fl. N. Z.* i. 195. A small, suberect, branched, shrubby plant, 4–10 in. high; branches erect, as thick as a sparrow-quill, pubescent, covered with close-set transverse scars. Leaves sessile, imbricate, erecto-patent,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, broadly obovate-oblong, obtuse, rather concave, obtusely keeled, rather glaucous; midrib obscure. Spikes short, very pubescent or tomentose, subdistichous. Flowers opposite, in the axils of large leafy ciliated bracts. Sepals oblong, obtuse, ciliated. Corolla deep purple; tube very short; limb  $\frac{1}{6}$  in. diam. Capsule ovate, acute, glabrous, twice as long as the calyx.

**Middle Island**: Port Cooper, *Lyall*; stony flats on the Hurumui mountains, alt. 800–1000 ft., *Travers*; Southern Alps, amongst shingle and grass, Hopkins, Godley, and Macaulay rivers, alt. 2–4000 ft., *Haast*. A very distinct little species, allied in some respects to *V. pinguifolia*, but more so to *V. Lavaudiana*, etc.

19. **V. Buchanani**, *Hook. f., n. sp.* Stems much branched from the base, 4–8 in. high; branches terete, stout, woody, tortuous, black, closely scarred, glabrous or upper pubescent. Leaves small,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, closely 4-fariously imbricate, spreading or recurved, nearly orbicular, sessile by a very broad base, concave, very obscurely keeled, nerveless, very thick and coriaceous, not shining. Spikes short, dense, terminal, short-peduncled, subcapitate,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long; peduncle and rachis tomentose. Flowers sessile; bracts and sepals oblong-ovate, obtuse, ciliate. Corolla white, about  $\frac{1}{5}$  in. broad. Ovary and base of style villous,

**Middle Island**: Otago, lake district, alpine, alt. 3–5000 ft., *Hector and Buchanan*.

20. **V. tetragona**, *Hook. Ic. Pl. t.* 580;—*Fl. N. Z.* i. 104. A small, erect or prostrate, much-branched shrub; branches (with the leaves on) obtusely 4-angled,  $\frac{1}{12}$ – $\frac{1}{8}$  in. diam. Leaves erect, densely imbricate, extremely coriaceous, ovate, obtuse, tumid,  $\frac{1}{12}$  in. long, the upper ciliated or pubescent on the edges, opposite pairs connate at the base, brown-black when dry. Flowers 3–5, sessile amongst the uppermost leaves. Sepals and bract linear-oblong, obtuse, ciliated. Corolla-tube short; limb  $\frac{1}{4}$  in. diam.—*Podocarpus Dieffenbachii*, *Hook. Ic. Pl. t.* 547.

**Northern Island**: Tongariro, *Bidwill*; Hikurangi, *Colenso*. **Middle Island**: Queen Charlotte's Sound, *Dieffenbach*; Gordon's Nob, *Munro*; Wai-au-na valley, alt. 3000 ft., *Travers*.

21. **V. lycopodioides**, *Hook. f., n. sp.* An erect?, very much branched, stout shrub; branches (with the leaves on) acutely 4-angled,  $\frac{1}{8}$ – $\frac{1}{10}$  in. diam., pale yellow-brown when dry. Leaves most densely and closely 4-fariously imbricate, thickly coriaceous, very broadly reniform-ovate, much broader than long, abruptly narrowed into an acute tip, about  $\frac{1}{10}$  in. broad, obtusely keeled, opposite pairs connate at the base, glabrous or pubescent on the edges. Flowers sessile, in small, dense, oblong heads at the ends of the branches; rachis tomentose; bracts larger than the leaves, not so broad in proportion, grooved in parallel lines when dry, ciliated. Sepals linear-oblong, obtuse, ciliated. Corolla-tube very short; limb  $\frac{1}{5}$  in. diam. Capsule broadly-oblong, obtuse, glabrous, not longer than the calyx.

**Middle Island**: Southern Alps, Ribbon-wood range, Big Ben, Macaulay river, etc., alt.

3-5000 ft., *Sinclair* and *Haast*; Wairau gorge, alt. 4-5000 ft., *Travers*; Otago, Lindis Pass, subalpine, *Hector* and *Buchanan*.

22. **V. tetrasticha**, *Hook. f., n. sp.* A small, much branched, decumbent plant, 3-6 in. high; branches (with the leaves on) acutely 4-farious,  $\frac{1}{12}$  in. diam., black when dry. Leaves spreading, most densely imbricate, coriaceous, broadly ovate, subacute, opposite pairs connate at the base, not keeled, ciliate, not shining. Flowers in very small, short, terminal, 2- or 3-flowered spikes, distinct from the branches; rachis tomentose; bracts and sepals ovate-oblong, obtuse, ciliated. Corolla-tube very short; limb  $\frac{1}{10}$  in. broad. Capsule not seen.

**Middle Island**: Southern Alps, fissures of rocks on Big Ben, and Hopkins river, alt. 4-5000 ft., *Haast*; Wairau mountains, alt. 4-5000 ft., *Travers*. Very different from *V. lycopodioides*, though not easily defined. Whole plant much smaller, black when dry. Leaves more spreading, though as densely imbricate; spikes not forming a sessile head to the branch; and flowers very small.

23. **V. Hectori**, *Hook. f., n. sp.* A robust, small, much-branched shrub, 6-24 in. high; branches (with the leaves on) terete or obscurely 4-gonous,  $\frac{1}{10}$ - $\frac{1}{8}$  in. diam. Leaves closely but not densely imbricate, extremely thick and coriaceous, tumid, broader than long, very broadly ovate or orbicular, very obtuse, nearly  $\frac{1}{8}$  in. across, opposite pairs connate to the middle, puberulous along the edges, shining, not keeled. Flowers collected into an ovate terminal head; rachis villous; bracts broader than the leaves, striated. Sepals broadly oblong, obtuse, ciliate. Corolla as in *V. lycopodioides*, pink and white. Ovary glabrous. Capsule as long as the sepals.

**Middle Island**: Southern Alps, *Haast*; Otago, Mount Alta, alt. 7-7500 ft., *Hector* and *Buchanan*. Very closely allied to *V. lycopodioides*, but the branches are scarcely tetragonous and the leaves very different, being connate to the middle and very obtuse.

24. **V. salicornioides**, *Hook. f., n. sp.* A small, much branched, erect or ascending, woody species, yellow-green when dry; branches (with the leaves on) terete,  $\frac{1}{16}$ - $\frac{1}{12}$  in. diam. Leaves closely imbricating, and closely appressed to and adnate with the branch, extremely short, opposite pairs connate almost throughout their length, each pair forming a short narrow ring about  $\frac{1}{20}$ - $\frac{1}{10}$  in. deep around the branch, truncate, scarcely acute, minutely ciliate. Flowers in small, short, oblong, terminal, 3-6-flowered heads; rachis villous; bracts short and very broad. Sepals oblong, obtuse. Corolla with a very short tube; limb  $\frac{1}{4}$  in. diam. Capsule small, oblong, obtuse, glabrous, a little longer than the calyx.

**Middle Island**: Nelson mountains, *Rough*; Wairau mountains, 4-5500 ft., *Travers*; Rangitata, and Waimakuriri mountains, alt. 3-4000 ft., *Haast*.

25. **V. cupressoides**, *Hook. f., n. sp.* A dense, excessively-branched bush, 1-6 ft. high; branches erect, fastigiate, slender, glabrous. Leaves very minute,  $\frac{1}{16}$  in. long, ovate-oblong, obtuse, not broader than the branch, opposite pairs connate at the base, erect or appressed, glabrous, fleshy. Flowers very small, 3 or 4 at the ends of the slender branchlets; bracts much larger than sepals, both broadly oblong, obtuse, not ciliated. Corolla violet; tube short; limb  $\frac{1}{16}$  in. diam. Capsule not seen.

**Middle Island**: Upper Wairau, alt. 4000 ft., and Tarndale, *Sinclair*; Wai-au-na valley,



3500 ft., *Travers*; Ashburton valley, 2-5000 ft., *Haast*; Otago, river flats of the lake district and Lindis Pass, *Hector and Buchanan*. A most curious species.

26. **V. *Haastii***, *Hook. f., n. sp.* A tortuous, decumbent or ascending, woody, sparingly branched, glabrous species, 4-10 in. long; branches uniformly and densely leafy, with the leaves on  $\frac{1}{2}$ - $\frac{3}{8}$  in. diam., obscurely 4-angled. Leaves densely 4-fariously imbricated, spreading, sessile,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, broadly obovate or orbicular, rounded at the tip, very coriaceous, opposite pairs almost connate at the base, sometimes with 1 obscure tooth on each side, slightly ciliate at the very base. Flowers sessile in pairs or more amongst the uppermost (floral) leaves, being apparently in reduced spikes, together collected into an oblong head  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long. Bracts ovate-oblong. Sepals  $\frac{1}{8}$  in. long, linear-oblong, scarcely ciliate. Corolla not seen. Capsule oblong, obtuse, scarcely longer than the calyx.

**Middle Island**; summits of Mounts Darwin, Dobson, Torlesse, and on Mount Cook, alt. 6-7000 ft., *Haast*. This and the following are most remarkable plants, of a different habit from any hitherto described.

27. **V. *epacridea***, *Hook. f., n. sp.* A small, tortuous, prostrate or ascending, glabrous, rigid, much-branched species; branches uniformly and densely leafy, with the leaves on  $\frac{1}{4}$  in. diam., obscurely 4-angled. Leaves sessile, densely 4-fariously imbricate, spreading and recurved,  $\frac{1}{8}$ - $\frac{1}{6}$  in. long, very broadly obovate-oblong, concave, keeled, rigid, glabrous, round or sub-acute at the tip. Flowers collected into terminal, ovoid, leafy heads, as in *V. Haastii*; bracts broadly ovate, ciliate, shorter than the sepals, which are linear-oblong, obtuse, ciliate. Corolla with a long tube; limb  $\frac{1}{12}$  in. diam. Capsule small, ovate-oblong, obtuse.

**Middle Island**: Tarndale, alt. 3500 ft., *Sinclair*; Discovery Peaks, alt. 5800 ft., *Travers*; Southern Alps, Ashburton valley, Godley glacier, and forming the highest vegetation on Mount Darwin, alt. 5-6500 ft., *Haast*; Wai-au-ua valley, 3500 ft., *Travers*. Nearly allied to *V. Haastii*, but quite distinct, much smaller, with recurved leaves and ciliate bracts and sepals.

28. **V. *macrantha***, *Hook. f., n. sp.* A short, stout, erect, rigid shrub, perfectly glabrous, sparingly branched; branches as thick as a small quill, terete. Leaves  $\frac{1}{2}$ -1 in. long, obovate-lanceolate, acute, obtusely serrate, narrowed into a short thick petiole, excessively thick and coriaceous, smooth, nerveless; midrib very indistinct. Racemes axillary, 5-7-flowered; peduncle longer than the leaves. Flowers very large, on short pedicels; bracts subulate-lanceolate, rigid, and the lanceolate, attenuate, acuminate, coriaceous sepals  $\frac{1}{4}$  in. long. Corolla  $\frac{3}{4}$  in. broad; tube very short. Capsule not seen.

**Middle Island**, *Travers*; Southern Alps, grassy hillsides, 2500-4000 ft., sources of the Waitaki, etc., *Haast*. This must be a very beautiful plant when fresh, the flowers are larger than in *V. elliptica*, white according to *Haast*.

29. **V. *Hulkeana***, *F. Muell.* A slender, erect, sparingly leafy shrub, 1-3 ft. high; stem nearly simple, terete, puberulous above. Leaves in distant pairs, 1-1 $\frac{1}{2}$  in. long, oblong-ovate, obtuse or acute, obtusely or acutely coarsely serrate, rather coriaceous; petiole  $\frac{1}{4}$ - $\frac{3}{8}$  in. long. Spikes spreading, puberulous and glandular, arranged in long terminal opposite-branched panicles 4-10 in. long and 2-4 broad. Flowers sessile; bracts broadly ovate, obtuse,  $\frac{1}{16}$  in. long, nearly as long as the similar but broader sepals.

Corolla  $\frac{1}{4}$  in. across, lilac; tube very short. | Stamens short. Capsule small, oblong, obtuse, twice as long as the sepals.

**Middle** Island: Wairau mountains, 1500–2000 ft., *Travers*; Macrae's Run, halfway up, in rocky places, *Munro*; Kaikoras mountains, *Sinclair*.

30. **V. Lavaudiana**, *Raoul, Choix, t. 10*;—*Fl. N. Z. i. 195*. A small, rather stout, puberulous species; stem decumbent at the base; branches ascending, terete, 4–8 in. high. Leaves rather crowded, short-petioled,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, broadly obovate-spathulate, obtuse, crenate-serrate, very coriaceous. Spikes short,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, crowded on a low spreading puberulous and glandular corymb 1–2 in. broad. Flowers sessile; bracts and sepals nearly equal, ovate or lanceolate, acuminate, ciliate and pubescent,  $\frac{1}{10}$  in. long. Corolla  $\frac{1}{3}$  in. diam., purple; tube rather long. Stamens very short. Capsule oblong, obtuse, a little longer than the calyx.

**Middle** Island: Akaroa, rocky mountains, *Raoul*; Port Cooper, on stony ground, *Lyall*; river bed of the Ashley, Canterbury plains, *Travers*.

31. **V. Raoulii**, *Hook. f., n. sp.* A small, robust, much-branched, erect shrub, 6–12 in. high; stem often tortuous at the base; branches terete, puberulous, erect or ascending, leafy. Leaves shortly petioled, rather crowded, suberect or spreading,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, oblong-spathulate, obtuse or apiculate, crenate, very thick and coriaceous, opaque or shining. Spikes very short, arranged in terminal pedicelled or subsessile crowded glabrous or puberulous corymbs  $\frac{1}{2}$  in. broad, or in heads, or all congested into an oblong crowded thyrsus 1–2 in. long. Flowers sessile; bracts and sepals very broadly oblong-ovate, obtuse, nearly glabrous. Corolla  $\frac{1}{4}$  in. broad; tube short. Stamens short. Capsule broadly oblong, obtuse, rather longer than the calyx.

**Middle** Island: Akaroa, *Raoul* (sent with *V. Lavaudiana*); Upper Wairau valley, alt. 3000 ft., *Munro, Travers*; rocks on the Kowai river, alt. 2500 ft., *Haast*.

32. **V. Benthami**, *Hook. f. Fl. Antarct. i. 60. t. 39 and 40*. An erect, much-branched shrub, 2–4 ft. high; branches very robust, closely transversely scarred, puberulous on the opposite sides. Leaves crowded towards the ends of the branches, sessile,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, linear- or obovate-oblong, obtuse; margin with a few deep serratures and edged with down, very coriaceous, flat, veinless, opposite pairs connate at the very base. Racemes terminal, continuous with the ends of the branches, clothed with imbricating foliaceous obovate bracts,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, which are edged with down. Flowers pedicelled, shorter than the bracts. Sepals unequal,  $\frac{1}{8}$  in. long, oblong-spathulate, edged with down. Corolla fine bright blue, nearly  $\frac{1}{3}$  in. diam.; tube short. Stamens short. Capsule very broadly ovate, acute, as broad as long, about as long as the sepals. Seeds broadly winged.

**Lord Auckland's** group and **Campbell's** Islands: abundant in rocky places, *J. D. H.* A most beautiful plant, quite unlike any New Zealand congener. The flowers are sometimes 5- or 6-merous, with three stamens and a 3-carpelled ovary.

33. **V. linifolia**, *Hook. f., n. sp.* A small, perfectly glabrous, leafy, herbaceous, procumbent, branched species; branches slender, terete, 2–6 in. long. Leaves rather close-set, spreading, sessile or shortly petioled,  $\frac{1}{2}$ –1 in. long,  $\frac{1}{12}$ – $\frac{1}{8}$  broad, linear, obtuse, quite entire, flat, not very coriaceous,

greenish when dry. Peduncles slender, axillary, longer or shorter than the leaves, 3-5-flowered; bracts leaf-like; pedicels often very long,  $\frac{1}{4}$ -1 in. long, curved. Sepals  $\frac{1}{2}$  in. long, linear-oblong, obtuse. Corolla  $\frac{1}{2}$  in. broad; tube very short. Stamens short. Capsule broadly obovate, shorter than the calyx.

**Middle Island:** Southern Alps, alt. 2500-4000 ft., Trinity Hill, Forest Creek, Ashburton and Great Clyde glaciers, clefts of rocks on Mount Darwin, etc., *Sinclair and Haast*.

34. **V. nivalis**, *Hook. f. Fl. N. Z. i. 196*. Stems long, rather stout, prostrate, sparingly branched, flexuose, puberulous, 6-10 in. long. Leaves on short petioles,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, ovate or broadly oblong-ovate, obtuse, deeply obtusely serrate, very coriaceous, black when dry. Peduncles 1-2 in. long, axillary, glandular-pubescent, 6-8-flowered; bracts minute; pedicels  $\frac{1}{10}$ - $\frac{1}{3}$  in. Sepals  $\frac{1}{2}$  in. long, oblong, obtuse, glandular. Corolla  $\frac{1}{5}$  in. broad, white with pink veins; lower lobe 2-fid; tube very short. Stamens short. Capsule transversely oblong, shorter than the calyx.—*Hook. Ic. Pl. t. 640; V. Hookeriana*, *Walp. Rep.*

**Northern Island:** Tongariro, *Bidwill*; summit of the Ruahine range, *Colenso*.

35. **V. Lyallii**, *Hook. f. Fl. N. Z. i. 196*. Stems slender, prostrate and rooting, diffusely branched, 5-15 in. long, glabrous or sparingly puberulous. Leaves short-petioled,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, ovate oblong-ovate or ovate-lanceolate, obtuse or acute, glabrous, with a few coarse serratures, coriaceous, black when dry. Peduncles axillary, slender, 3-8 in. long, glabrous, many-flowered; pedicels slender, lower  $\frac{1}{2}$  in. long; bracts very variable, oblong linear or spatulate. Sepals as variable, glabrous. Corolla nearly  $\frac{1}{2}$  in. diam.; tube very short. Stamens very short. Capsule transversely oblong, didymous, as long as or longer than the sepals.

**Northern Island:** rocky cliffs near Patea (leaves larger, acute, passing into *V. cataractæ*, B) and summit of Ruahine range (plants very small), *Colenso*. **Middle Island:** abundant in many places; Otago, *Hector*, etc.; Milford Sound, *Lyall*; rocky rivulets, Ashburton river and Rangitata range, 2-4000 ft., *Haast*. This seems to me to be a plant which, assuming widely different forms, passes into *V. nivalis*, by the raceme becoming few-flowered and glandular; into *V. Bidwillii* by the leaves becoming much smaller, etc.; into *V. cataractæ* by the leaves becoming larger and longer; and into var. *diffusa* of *V. cataractæ* by the leaves becoming larger and broader. Most of these forms, however, appear to keep their characters over large areas, where several of them occur together, and the extreme states are very widely dissimilar.

36. **V. Bidwillii**, *Hook. Ic. Pl. t. 814;—Fl. N. Z. i. 196*. Stems prostrate, slender, creeping at the base, 3-6 in. long, glabrous or puberulous. Leaves minute, sessile,  $\frac{1}{2}$ - $\frac{1}{4}$  in. long, broadly ovate oblong or oblong-ovate, obtuse, with 1 or 2 deep notches on each side, coriaceous, black when dry. Peduncles axillary, usually very long and slender, 2-10 in. long, few- or many-flowered, glabrous. Flowers racemed or sometimes in interrupted whorls; pedicels slender, lower  $\frac{1}{2}$  in. long; bracts and sepals very small,  $\frac{1}{12}$ - $\frac{1}{8}$  in., oblong, obtuse, puberulous. Corolla  $\frac{1}{4}$  in. diam. or more, violet white or pink; tube very short. Stamens small. Capsule didymous,  $\frac{1}{10}$  in. broad, longer than the calyx.

**Middle Island:** bed of the Wairau, alt. 2-3000 ft., *Bidwill*, *Travers*; Rotnite Lake, *Munro*; Southern Alps, abundant above 1500 ft., *Sinclair and Haast*; Otago, lake district and

Lindis Pass, alt. 1-3000 ft., *Hector and Buchanan*. A much smaller plant than *V. Lyallii*, with usually smaller flowers and sepals, and leaves with only one or two serratures on each side.

**37. *V. cataractæ*, Forst. ;—*Fl. N. Z.* i. 195.** Quite glabrous. Stems suberect or prostrate at the base and ascending, 10 in. to 2 ft. long, branched, rather slender, terete. Leaves very variable, sessile or petioled,  $\frac{1}{2}$ –5 in. long, ovate-oblong or narrow-lanceolate, acuminate, deeply acutely serrate, coriaceous, when dry black above and brown or whitish beneath. Racemes axillary, slender, 3–8 in. long, very many-flowered; pedicels very slender,  $\frac{1}{2}$ –1 long; bracts linear-subulate. Sepals linear-oblong, acute, glabrous. Corolla  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam.; tube very short. Stamens short. Capsule small, didymous,  $\frac{1}{10}$ – $\frac{1}{6}$  in. broad, as long as or longer than the calyx.

Var.  $\alpha$ . Leaves 2–5 in. long, lanceolate, stems long.

Var.  $\beta$ . *diffusa*. Leaves ovate or oblong,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long.—*V. diffusa*, Hook. Ic. Pl. t. 645; *Fl. N. Z.* i. 195.

Var.  $\gamma$ . *lanceolata*. Stems short. Leaves 1 in. long,  $\frac{1}{12}$  broad, very narrow linear-lanceolate.—*V. lanceolata*, Benth.

**Northern Island:** east coast, Taupo, Tongariro, and Ruahine range, *Colenso and Bidwill*. **Middle Island:** Dusky Bay, *Menzies, Lyall*.

**38. *V. elongata*, Benth. ;—*Fl. N. Z.* i. 197.** A very slender, prostrate, straggling herb, glabrous or pubescent, diffusely branched; branches terete. Leaves petioled,  $\frac{1}{2}$ –1 in. long, broadly ovate-cordate or deltoid-ovate, coarsely irregularly crenate-toothed, 3-nerved, glabrous or hairy; petioles  $\frac{1}{4}$ – $\frac{1}{2}$  long, dilated at the blade. Peduncles axillary, stout, 2–6 in. long, few- or many-flowered; bracts rather large, linear-oblong or spatulate; pedicels slender,  $\frac{1}{2}$  in. long. Sepals foliaceous, obovate-oblong, obtuse, growing out much after flowering. Corolla small,  $\frac{1}{8}$ – $\frac{1}{6}$  in. diam.; tube very short. Stamens very short. Capsule broadly didymous, enclosed in the calyx.

**Northern Island:** Bay of Islands, *Cunningham*, etc. A very distinct species, allied to the Australian *V. calycina*.

**39. *V. spathulata*, Benth. ;—*Fl. N. Z.* i. 197.** Stems prostrate, short, stout, tufted, much-branched, leafy, pubescent, 2–4 in. long. Leaves narrowed into broad petioles,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam., broadly ovate-spatulate, obtuse, crenate, coriaceous, pubescent, black when dry. Peduncles shorter or rather longer than the leaf, stout, erect, pubescent, 2- or 3-flowered; pedicels stout,  $\frac{1}{8}$  in. long; bracts foliaceous. Sepals oblong, obtuse. Corolla  $\frac{1}{4}$  in. diam.; tube very short. Stamens short. Capsule didymous, longer than the calyx.

**Northern Island:** Tongariro, *Bidwill*. Perhaps an alpine form of *V. elongata*. I have seen but one specimen.

**40. *V. Anagallis*, Linn. ;—*Fl. N. Z.* i. 197.** A rather stout, erect, succulent, glabrous herb; stem rooting at the base, 6–18 in. high. Leaves 1–2 in. long, oblong or linear-oblong, obtuse, crenate, contracted and half stem-clasping at the base, membranous when dry. Peduncles extremely slender, axillary, many-flowered, longer than the leaves; bracts small, linear or lanceolate; pedicels very slender,  $\frac{1}{4}$  in. long, spreading or reflexed. Sepals oblong, obtuse,  $\frac{1}{10}$  in. long, growing out after flowering. Corolla small,  $\frac{1}{2}$  in. diam., pale-blue or flesh-coloured; tube very short. Stamens short. Capsule broadly oblong, included in the calyx.



**Northern** Island: watery places on the east coast, *Colenso*. A very common subaquatic plant, found in very many parts of the world.

*Veronica serpyllifolia* and *V. arvensis* are both found as weeds of cultivation.

### 8. PYGMEA, Hook. f., nov. gen.

Moss-like, tufted, low herbs. Leaves densely imbricated all round the short branches, ciliated. Flowers solitary, terminal, sessile or shortly peduncled.—Sepals 5 or 6, linear-spathulate, unequal, ciliate. Corolla salver-shaped; tube longer than the calyx; limb 5- or 6-lobed; lobes linear- or oblong-spathulate. Stamens 2, inserted at the throat of the corolla; filaments variable in length; anthers large. Disk annular, rather large. Ovary broadly ovoid, compressed, 2-celled; style capillary; ovules numerous, attached to placentas on the septum. Fruit not seen.

The following are the only known species. The genus appears closely allied to *Veronica*, but differs in the 5- or 6-parted flowers, and leaves not quadrifariouly arranged.

Leaves  $\frac{1}{8}$  in., ciliate at the edges only . . . . . 1. *P. ciliolata*.  
Leaves  $\frac{1}{8}$  in., hispid and ciliate above the middle . . . . . 2. *P. pulvinaris*.

1. ***P. ciliolata***, *Hook. f., n. sp.* Patches broad, moss-like, rather hoary from the long white hairs on the leaves; branches  $\frac{1}{2}$  in. high, with the leaves on  $\frac{1}{4}$  in. diam. Leaves most densely imbricate,  $\frac{1}{8}$  in. long, broadly oblong-spathulate, obtuse, quite entire, ciliate from above the middle, coriaceous, glabrous. Flowers  $\frac{1}{8}$  in. long, emerging from the tips of the branches. Sepals shorter than the corolla-tube.

**Middle** Island: Discovery Peaks, alt. 5500 ft., *Travers*; Hopkins river, *Haast*.

2. ***P. pulvinaris***, *Hook. f., n. sp.* Patches broad, moss-like; habit and branches as in *P. ciliolata*, but more hoary, and almost white from the much longer white hairs. Leaves most densely imbricate,  $\frac{1}{8}$  in. long, narrow linear, somewhat dilated towards the tip, upper half covered with long, white, rigid, hispid hairs on both surfaces and edges. Flowers shortly peduncled. Sepals linear, obtuse. Corolla as in *P. ciliolata*, but larger.

**Middle** Island: summit of Mount Torlesse, forming large, hoary, moss-like patches, alt. 5500–6500 ft., *Haast*.

### 9. OURISIA, Comm.

Perennial herbs. Leaves chiefly radical, petioled, crenate or entire. Scapes bracteate, 1- or many-flowered. Flowers rather large, whorled racemed corymbose or solitary.—Calyx 5-lobed or -partite. Corolla irregular, funnel-shaped, incurved or oblique; limb 5-fid. Stamens 4, included, didynamous; anther-cells divaricating, confluent. Stigma capitate. Capsule 2-valved, loculicidal. Seeds numerous; testa lax.

A beautiful genus, confined to the alps of Tasmania, New Zealand, the Andes of South America, and Fuegia.

Upper bracts whorled. Calyx  $\frac{1}{4}$  in., glandular. Capsule  $\frac{1}{4}$  in. long . 1. *O. macrophylla*.  
Upper bracts whorled. Calyx  $\frac{1}{2}$  in. glabrous. Capsule  $\frac{1}{2}$  in. long . 2. *O. macrocarpa*.  
Upper bracts in pairs.

Erect. Leaves crenate; petioles slender . . . . . 3. *O. Colensoi*.

- Erect. Leaves crenate; petioles short and broad . . . . . 4. *O. sessilifolia*.  
 Creeping, caespitose. Leaves entire or subcrenate. Scape and sepals  
 glabrous . . . . . 5. *O. caespitosa*.  
 Creeping, caespitose. Leaves crenate. Scape and sepals glandular  
 and hairy . . . . . 6. *O. glandulosa*.

1. ***O. macrophylla***, *Hook. Ic. Pl. t.* 545, 546;—*Fl. N. Z.* i. 197. Erect, more or less pubescent or tomentose. Rhizome short, decumbent at the very base. Leaves all radical, long-petioled, 1–6 in. long, oblong or ovate-cordate, obtuse, crenate. Scape 2–30 in. high. Bracts on the scape, lower pair opposite, upper whorled, all oblong-obovate or linear, very variable in form and size, crenate. Flowers umbelled, in superimposed whorls; pedicels 1–2 in. long, very slender. Calyx 5-partite; lobes glandular hairy or glabrate, linear or lanceolate,  $\frac{1}{4}$  in. long. Corolla  $\frac{1}{2}$  in. long. Capsules membranous,  $\frac{1}{4}$  in. long, broadly oblong, turgid.

**Northern** Island: Mount Egmont, Ruahine range, etc., *Dieffenbach*, *Colenso*, etc.

**Middle** Island: common in damp mountainous localities, Upper Wairau, alt. 2500–5000 ft., *Sinclair*, *Travers*.

2. ***O. macrocarpa***, *Hook. f. Fl. N. Z.* i. 198. Erect, nearly glabrous. Rhizome prostrate, as thick as the little finger. Leaves all radical, with long stout petioles, 4–6 in. long; blade 1–2 in. long, orbicular broadly oblong or ovate-oblong, round at the tip, crenate, coriaceous, glabrous, except along the edges of the petiole, veins strongly reticulate. Scape very stout, 8–18 in. high; lower bracts in pairs, connate, oblong, crenate, upper whorled, all coriaceous. Flowers umbelled in several whorls. Pedicels stout, 1–3 in. long. Calyx 5-partite; lobes glabrous,  $\frac{1}{2}$  in. long, linear-oblong, obtuse, very coriaceous. Corolla not seen. Capsule narrow-oblong,  $\frac{1}{2}$  in. long.

**Middle** Island: Chalky Bay, *Lyall*. Well distinguished from *O. macrophylla* by its glabrous condition, stout habit, very coriaceous leaves, very large sepals and elongate capsule.

3. ***O. Colensoi***, *Hook. f., n. sp.*—A small, erect, glandular-pubescent species, 2–6 in. high. Rhizome slender, creeping. Leaves  $\frac{1}{2}$  in. long or less, petiole as long, oblong, obtuse, crenate, pubescent on both surfaces or glabrate. Scape 1–4-flowered, slender; bracts all in pairs, oblong, crenate. Flowers solitary or in pairs; pedicels slender,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long. Calyx 5-partite; lobes  $\frac{1}{6}$  in. long, narrow-linear, glandular-pubescent. Corolla white, nearly  $\frac{2}{3}$  in. diam. Capsule shorter than the sepals, nearly orbicular.

**Northern** Island: top of the Ruahine range and Lake Taupo, *Colenso*. **Middle** Island: Wairau mountains, alt. 3–3500 ft., *Travers*.

4. ***O. sessilifolia***, *Hook. f., n. sp.* Erect, hirsute, and glandular; rhizome creeping, as thick as a crow-quill. Leaves all radical,  $\frac{2}{3}$ –1 $\frac{1}{3}$  in. long, broadly ovate, abruptly narrowed into broad short petioles, crenate-serrate, upper surface villous with glandular hairs, lower less so or glabrate. Scape stout, 3–4 in. high; bracts all opposite, oblong or obovate, crenate. Flowers in pairs; pedicels rather stout,  $\frac{1}{2}$ –1 in. long. Calyx 5-partite; lobes broad, linear, obtuse, glandular. Corolla large, nearly 1 in. diam.; lobes long, rounded, white. Capsule not seen.

**Middle** Island: Mount Brewster, alt. 5–6000 ft., *Haast*. Apparently a very distinct plant; I have only one good specimen.

5. **O. cæspitosa**, Hook. f. *Fl. N. Z.* i. 198. Stems creeping, stout, tufted, leafy, rather fleshy, with very short ascending branches, glabrous or loosely pilose or subtomentose. Leaves somewhat imbricate, patent, recurved, thickly coriaceous,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, obovate-spathulate, with recurved 2- or 3-lobed or crenate margins, sessile or narrowed into short, glabrous or ciliate, stout petioles. Scape 2–3 in. high, 1–6-flowered; bracts opposite, like the leaves. Flowers solitary or 2 or 3 together; pedicels stout. Calyx  $\frac{1}{4}$  in. long, 5-lobed; lobes oblong, obtuse, glabrous. Corolla white,  $\frac{1}{3}$ – $\frac{1}{2}$  in. diam.; lobes short, broad. Capsule  $\frac{1}{6}$  in. long, ovate-oblong.

**Northern** Island: tops of the Ruahine mountains, *Colenso*. **Middle** Island: Milford Sound, *Lyall*; Hurumui mountains, alt. 3–3500 ft., *Travers*; Southern Alps, common at 3500–6000 ft., *Haast*; Otago, lake district, alpine, alt. 6000 ft., *Hector and Buchanan*.

6. **O. glandulosa**, Hook. f., *n. sp.* Stems very stout, succulent, creeping, 3–6 in. long, glabrous. Leaves usually densely 2-fariously imbricate,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, obovate-spathulate, sessile by a broad base, spreading or recurved, thickly coriaceous, ciliated with stout closely articulate hairs, entire or obscurely crenate. Scapes stout, 1–2 in. long, with several pairs of opposite spathulate bracts, which as well as the scape and calyx are covered with glandular hairs. Flowers 1–3, pedicels slender. Sepals  $\frac{1}{4}$  in. long, oblong, obtuse. Corolla white,  $\frac{1}{3}$ – $\frac{3}{4}$  in. diam.

**Middle** Island: Otago, lake district, alpine, alt., 5000 ft., forming large patches *Hector and Buchanan*.

# 10. EUPHRASIA, Linn.

Small or large, simple or branched, annual or perennial plants. Leaves small, opposite, toothed lobed or pinnatifid.—Calyx tubular or campanulate, 4-lobed, rarely 5-lobed. Corolla 2-lipped; upper lip concave, 2-fid, lobes broad spreading; lower spreading, 3-fid, lobes obtuse emarginate. Stamens 4, didynamous; anther-cells nearly parallel, one or both often spurred. Stigma dilated. Capsule oblong, compressed, 2-valved.

A genus of which one or two very small species are found throughout northern Europe and Asia, and as many in colder South America, but of which the majority are Australian and New Zealand. The species are difficult of discrimination and very variable.

*Flowers*  $\frac{1}{3}$ – $\frac{1}{2}$  in. long and broad.

Erect, 6–30 in. high. Leaves  $\frac{1}{3}$ – $\frac{2}{3}$  in., margins not revolute . . . . . 1. *E. cuneata*.

Erect, 3–6 in. high. Leaves  $\frac{1}{3}$ – $\frac{1}{2}$  in.; margins revolute . . . . . 2. *E. Munroi*.

Decumbent or tufted, much branched. Leaves  $\frac{1}{2}$ – $\frac{1}{3}$  in., margins cut and revolute . . . . . 3. *E. revoluta*.

*Flowers*  $\frac{1}{6}$ – $\frac{1}{3}$  in. long.

Erect, 1–2 in. high, diffusely branched. Leaves cut; margins revolute . . . . . 4. *E. antarctica*.

Creeping and rooting, 1–2 in. long. Leaves  $\frac{1}{2}$  in., 3-fid; margins flat . . . . . 5. *E. repens*.

1. **E. cuneata**, Forst.;—*Fl. N. Z.* i. 199. An erect, annual, branched, glabrous or puberulous, leafy, slender species, 6–30 in. high. Leaves in remote pairs or fascicled on short branchlets,  $\frac{1}{4}$ – $\frac{2}{3}$  in. long, obovate-oblong or spathulate or cuneate-oblong, rarely ovate, narrowed into stout or slender petioles, coarsely toothed; margins not recurved. Flowers numerous, shortly peduncled. Calyx campanulate, 4-lobed; lobes short, obtuse. Corolla  $\frac{1}{3}$ – $\frac{2}{3}$

in. long, pink purplish or yellowish; tube slender, funnel-shaped; lobes obovate, upper notched. Anthers pilose, mucronate, spurs of the posterior pair unequal. Capsule  $\frac{1}{3}$  in. long, linear-clavate.

**Northern Island:** from the East Cape, southward, *Banks and Solander*, etc. **Middle Island:** common throughout. A very variable plant, allied to the Australian *E. collina*.

2. **E. Munroi**, *Hook. f., n. sp.* A short, erect, perennial (?), leafy species, 3–6 in. high, glabrous or minutely glandular and pubescent; branches ascending, leafy. Leaves rather crowded, spreading and recurved,  $\frac{1}{5}$ – $\frac{1}{3}$  in. long, sessile, broadly ovate-oblong or spatulate, obtuse, very coriaceous; margins recurved, thick, sparingly crenate. Flowers few, chiefly at the ends of the branches, very shortly peduncled. Calyx sometimes 2-lipped, lips erect, one 3-lobed the other 2-lobed or entire; lobes obtuse, short, with revolute edges. Corolla  $\frac{1}{2}$  in. long; tube short, funnel-shaped; lobes short, retuse. Anthers hairy, anterior pair with 2 obtuse or shortly mucronate cells, posterior with 1 cell spurred, the other obtuse or acute. Capsule broadly oblong, retuse.

**Middle Island:** abundant on the alps, Dun mountain, *Munro*; Hnrumui range and Discovery Peak, alt. 3500–5000 ft., *Travers*; Southern Alps, *Sinclair and Haast*. I fear that this may prove nothing but an alpine state of *E. cuneata*, but it looks very different. It is very near indeed to the Tasmanian *E. alpina*.

3. **E. revoluta**, *Hook. f. Fl. N. Z. i. 199.* A small, much branched, slender annual, 1–2 in. high, almost prostrate, sometimes tufted, glandular pubescent or glabrate. Leaves  $\frac{1}{2}$ – $\frac{1}{6}$  in. long, obovate-spatulate, sessile, obtuse, crenate or lobed; margins strongly recurved. Flowers solitary or very few at the ends of the branches; peduncles shorter or longer than the leaves. Calyx shortly 4-lobed; lobes obtuse; margins recurved. Corolla nearly  $\frac{1}{2}$  in. long, and as much in diameter. Anthers nearly glabrous. Cells all shortly mucronate, those of the posterior pair unequally. Capsule small, broad, oblong, obtuse, retuse.

**Northern Island:** summit of the Ruahine range, *Colenso*. **Middle Islands:** Nelson mountains, alt. 5500 ft., *Travers*; Mount Brewster, *Haast*; Otago, lake district, alpine, forming patches, alt. 6300 ft., *Hector and Buchanan*; Dusky Bay, *Lyall* (leaves deeply cut). A very different-looking plant from *E. Munroi*, small, stout or slender, much branched, tufted or straggling, but some specimens are difficult to distinguish. The habit is that of *E. antarctica*. The flowers seem variable as to colour. Very near the Chilean *E. suberserta*.

4. **E. antarctica**, *Benth.;—Fl. N. Z. i. 199.* A small, slender, rarely robust, much branched, glabrous or glandular, puberulous annual, 1–2 in. high. Leaves sessile or very shortly petioled,  $\frac{1}{10}$ – $\frac{1}{8}$  in. long, deeply lobed or subpinnatifid, ovate or obovate; lobes obtuse; margins recurved. Flowers small, sessile or shortly peduncled, numerous towards the ends of the branches or solitary, often amongst crowded subterminal leaves. Calyx oblong; lobes very short, obtuse. Corolla  $\frac{1}{8}$ – $\frac{1}{4}$  in. long; upper lip short, arched; lobes short. Anther-cells all nearly glabrous and mucronate. Capsule broadly obovate-oblong, retuse.

**Northern Island:** summit of the Ruahine range, *Colenso*. **Middle Island:** abundant on all the alps, from 2–6000 ft. elevation, *Munro*, *Lyall*, *Travers*, *Sinclair*, *Haast*, *Hector and Buchanan*, etc. Hector traces three forms, corresponding to as many zones of elevation



on Mount Alta; 1st, a slender, erect form, with peduncled flowers, alt. 1-2000 ft.; 2nd, a robust spreading form with the flowers amongst crowded, subterminal leaves, alt. 3-5000 feet; and 3rd, a most minute form,  $\frac{1}{8}$  in. high, with a single flower, alt. 6000 ft. I have a very large robust form, from rivulets, Lake Tekapo, alt. 3500 ft. (*Haast*), with leaves and calyx  $\frac{1}{2}$  in. long. This is a common Chili and Fuegian plant, and has a very nearly allied Australian alpine representative in *E. alsa*, F. Muell.

5. **E. repens**, *Hook. f. Fl. N. Z.* i. 200. A very small, slender, creeping, glabrous or puberulous plant, 1-2 in. long; branches prostrate, with fibrous rootlets. Leaves minute, sessile,  $\frac{1}{12}$  in. long, in scattered pairs, cuneate, 3-lobed; lobes acute, erect; margins not recurved. Flowers axillary, shortly peduncled, large for the size of the plant, erect. Calyx oblong, campanulate, lobes short, acute. Corolla  $\frac{1}{3}$  in. long; tube long; upper lip short; arched; lower with 3 short lobes. Anthers all nearly glabrous; cells all mucronate. Ovary pubescent; stigma elongate.

**Middle Island**: Bluff Island, *Lyall*. A curious little species, of which more specimens are much wanted.

## ORDER LIV. GESNERIACEÆ.

(Including CYRTANDREÆ.)

Shrubs or herbs. Leaves opposite or alternate. Flowers hermaphrodite, usually irregular.—Calyx inferior, 5-toothed -lobed or -partite. Corolla usually 2-lipped, 5-lobed, imbricate. Stamens 2-4, inserted on the tube of the corolla, with sometimes the filament of a fifth; anthers 2-celled; cells sometimes confluent. Ovary superior, 2-celled; placentas 2, parietal, sometimes meeting in the axis; style simple, stigma 2-lobed; ovules numerous. Fruit capsular. Seeds small; albumen fleshy or 0.

A large Order, chiefly of tropical plants. The above character does not apply to many American and other genera, which have inferior ovaries and baccate fruit.

### 1. RHABDOTHAMNUS, A. Cunn.

A slender, hispid or pubescent shrub. Leaves opposite. Flowers solitary or in pairs.—Sepals 5, unequal, persistent. Corolla-tube campanulate; limb 2-lipped; upper lip 2-lobed, under 3-lobed. Stamens 4, the fifth rudimentary; filaments slender, arched; anthers cohering cruciately. Disk thin, annular, lobed. Ovary 1-celled, narrowed into a slender style; stigma small, obtuse, 2-lobed; ovules numerous, on 2-lobed prominent placentas. Capsule ovoid, beaked, 2-valved; valves 2-fid, separating from the placentas. Seeds very minute, albuminous.

1. **R. Solandri**, *A. Cunn.*;—*Fl. N. Z.* i. 186. Shrub 2-4 ft. high; branches opposite, hispid, terete. Leaves on slender petioles, broadly obovoid or orbicular,  $\frac{1}{2}$ — $\frac{2}{3}$  in. diam., coarsely toothed, harsh to the touch. Flowers axillary or terminal; peduncles slender,  $\frac{1}{2}$ — $\frac{3}{4}$  in. long. Sepals lanceolate, acuminate,  $\frac{1}{3}$  in. long. Corolla  $\frac{2}{3}$  in. long, orange with red stripes. Capsule shorter than the calyx.

**Northern Island**: from the Bay of Islands to Wellington, *Banks and Solander*, etc. The foliage somewhat resembles *Trophis aspera* and *Carpodetus serratus*.

## ORDER LV. LENTIBULARIÆ.

Marsh or aquatic herbs, often floating. Leaves various, sometimes 0, or reduced to minute bladders. Flowers on leafless scapes.—Calyx usually 2-lobed or of 2 sepals, rarely 5-lobed. Corolla irregular, 2-lipped, produced into a prominence or spur behind. Stamens 2, inserted at the base of the tube; filaments short incurved; anthers 1-celled. Ovary free, 1-celled; style short, stigma 2-lipped; ovules numerous, on a free central placenta. Capsule 2-valved, many-seeded. Seeds minute; albumen 0; embryo short.

An Order of two principal genera, one of which (*Utricularia*) is found in almost all parts of the world.

## 1. UTRICULARIA, Linn.

Herbs, often aquatic. Stems 0, or creeping or slender and floating; rhizome bearing minute air-bladders. Leaves 0 or cauline or radical, usually linear and quite entire or multifid. Scape slender, 1- or more-flowered.—Sepals 2, nearly equal, entire toothed or lobed. Corolla 2-lipped; lower lip gibbous or spurred at the base. Stamens 2; anthers adnate to the thick filament. Ovary globose; stigma 2-lipped.

A large genus, found in all parts of the temperate and tropical world. The New Zealand species want searching for and working up.

Stems floating. Leaves capillary, multifid. Flowers yellow . . . 1. *U. protrusa*.  
Stem 0 or creeping. Leaves linear.

Scape 3-4 in., 1-4-flowered. Upper lip of corolla white, cuneate . . . 2. *U. novæ-Zelandiæ*.

Scape  $\frac{1}{2}$ -1 in., 1-flowered. Upper lip of corolla purple, linear . . . 3. *U. monanthos*.

Scape 3-4 in., 1-4-flowered. Upper lip of corolla linear . . . 4. *U. Colensoi*.

1. ***U. protrusa***, *Hook. f. Fl. N. Z.* i. 206. Stems floating, slender, a span long, covered with capillary multifid leaves and bearing minute bladders. Scape stout, erect, 2-4-flowered. Sepals oblong. Corolla yellow; upper lip 3-lobed, lower broader, subquadrate, its disk protruded; margins recurved. Spur short, obtuse.

**Northern** Island: bogs, Bay of Plenty, *Colenso*. The above description is taken from the 'Flora of New Zealand,' the specimens being lost.

2. ***U. novæ-Zelandiæ***, *Hook. f. Fl. N. Z.* i. 206. A slender herb. Roots or rhizomes creeping, fibrous, covered with pedicelled bladders. Leaves all radical, few, linear-lanceolate, quite entire, 1-nerved, deciduous. Scape 3-5 in. high, simple, erect, 1-4-flowered at the very top. Flowers shortly pedicelled; bracts broadly ovate, obtuse. Upper sepal orbicular, obtuse, 2-lobed or retuse; lower concave, obscurely 3-toothed. Corolla white; upper lip wedge-shaped, retuse, lower broadly axe-shaped; margin entire. Spur prominent, obtuse.

**Northern** Island: wet rocks at Palliser Bay, *Colenso*. Allied to the Australian *U. dichotoma*, but much smaller.

3. ***U. monanthos***, *Hook. f. ;—Fl. Tasm.* i. 298. A small, very slender, erect plant, not 1 in. high. Rhizomes or roots creeping, bearing minute pedicelled bladders. Leaves narrow linear-lanceolate. Scape 1-flowered,  $\frac{1}{2}$ -1

in. high. Sepals oblong, obtuse. Corolla purple; upper lobe linear, notched, lower axe-shaped. Spur short, broad, notched.

**Middle Island:** Raungitata range, *Sinclair and Haast*. Also found in Tasmania.

4. **U. Colensoi**, *Hook. f. Fl. N. Z.* i. 206. Altogether like *U. novæ-Zelandiæ*, but with upper lip of the corolla linear-oblong. 2-lobed, lower broadly cuneate, 3-lobed, middle lobe retuse; disk with 3 gibbous prominences.

**Northern Island:** east coast, *Colenso*. The only specimens were preserved in fluid with *U. protusa*, and lost with them.

## ORDER LVI. VERBENACEÆ.

(Including MYOPORINÆ.)

Shrubs or trees, more rarely herbs. Leaves opposite or alternate, exstipulate. Flowers hermaphrodite.—Calyx inferior, 4- or 5-toothed -parted or -lobed. Corolla regular, or irregular and 2-lipped, imbricate in bud. Stamens usually 4 or 5, inserted in pairs on the corolla, or equidistant and alternating with its lower lobes. Ovary entire or 4-lobed, rarely deeply, 2-4-celled; style slender, entire or 2-fid; ovules 1 or 2 in each cell, erect or pendulous. Fruit dry or fleshy, indehiscent, sometimes divided into cocci. Seed with little or no albumen; cotyledons thick, straight or conduplicate.

A large, chiefly tropical Order, found in all parts of the globe. The *Myoporinæ*, usually considered as a Natural Order, cannot be separated; they are chiefly confined to Australia and the Pacific islands.

Tree. Leaves opposite, 3-5-foliolate. Corolla 2-lipped. Drupe 4-celled . . . . .

1. VITEX.

Shrub. Leaves opposite, simple. Corolla 2-lipped. Fruit dry, 4-partite . . . . .

2. TEUCRIDUM.

Tree, maritime. Leaves opposite, simple. Corolla regular. Seed germinating on the tree . . . . .

3. AVICENNIA.

Shrub. Leaves alternate, with pellucid glands. Corolla regular . . . . .

4. MYOPORUM.

### 1. VITEX, Linn.

Trees or shrubs. Leaves digitately 3-5-foliolate. Flowers in axillary or terminal cymes or panicles.—Calyx 5-toothed or -lobed. Corolla 5-lobed, 2-lipped. Stamens 4; filaments long, declinate. Ovary 4-celled; style 2-fid; ovules pedulous. Drupe with a 4-celled nut.

A large tropical and subtropical genus.

1. **V. littoralis**, *A. Cunn.*;—*Fl. N. Z.* i. 203. A large tree, 50-60 ft. high; trunk 20 in girth; wood hard. Leaves on petioles 2-4 in. long; Leaflets 3-5, petioled, oblong or obovate, acute, glabrous, 3-4 in. long. Panicles axillary, spreading, 4-8-flowered, dichotomously branched; peduncles and pedicels slender. Calyx cup-shaped, obscurely lobed. Corolla 1 in. long, pubescent, pink or dull red; upper lip arched, 2-fid; lower deflexed, 3-fid. Drupe obovoid, bright red.—*Hook. Ic. Pl.* t. 419, 420.

**Northern Island:** along the east coast, common. **Middle Island:** Canterbury, *Haast*. Wood much used, extremely hard, said to be indestructible under water.

2. **TEUCRIDIMUM**, Hook. f.

Shrubs, with slender 4-angled branches. Leaves small, simple. Flowers axillary, solitary.—Calyx campanulate, 5-toothed, persistent. Corolla campanulate, 2-lipped; upper lip of 4 short lobes, lower longer. Stamens long, exerted, arching downwards; anthers 1-celled. Ovary 4-lobed, 2-celled; cells incompletely divided again; style 2-fid; ovules 4, pendulous. Fruit sunk in the calyx, small, 4-lobed, hispid, splitting into 4 nuts. Testa thin. Cotyledons large, ovate; inferior radicle short.

A genus of two species, one found in subtropical Australia (*T. sphaerocarpum*, Muell.), the other the following. The lobed ovary is anomalous in the Order, and shows a tendency towards *Labiata*, but the reversed position of the flower at once distinguishes this.

1. **T. parvifolium**, Hook. f. *Fl. N. z. i.* 203. *t.* 49. A much-branched slender, twiggy shrub, 2–5 ft. high, forming thickets, dichotomously branched, more or less pubescent. Leaves orbicular, broadly ovate or spathulate,  $\frac{1}{8}$  in. long, with petioles  $\frac{1}{8}$ – $\frac{1}{2}$  in. long. Peduncles short, 2-bracteolate. Calyx-teeth acute. Corolla hairy, blue,  $\frac{1}{2}$ – $\frac{3}{8}$  in. long.

**Northern** Island: Wairarapa valley, *Colenso*. **Middle** Island: Nelson, *Bidwill*, *Travers*; Akaroa, *Raoul*; Canterbury plains, *Travers*.

3. **AVICENNIA**, Linn.

Evergreen, littoral trees, hoary with down; roots branching over the mud. Leaves opposite, quite entire. Peduncles short, axillary, 3-chotomous. Flowers sessile, surrounded by bracts.—Calyx equal, 4- or 5-partite. Corolla small, coriaceous, campanulate; limb 4- or 5-fid; lobes equal or posterior larger, nearly valvate. Stamens 4, filaments short; anthers 2-celled. Ovary ovoid or conical, silky, 2-celled; style short or 0, stigmas 2 short erect finally diverging; ovules 2, collateral, pendulous in each cell. Fruit obliquely ovoid, compressed, coriaceous, 1-celled, 1-seeded. Seed consisting of an immense embryo, with scanty albumen and imperceptible testa; cotyledons cordate, very broad; radicle long, thick, woolly, descending from the fruit before it falls.

A small genus of littoral, tropical, and subtropical trees, abounding in brackish, muddy creeks and estuaries.

1. **A. officinalis**, Linn.—*A. tomentosa*, Jacq.;—*Fl. N. Z. i.* 214. A small tree. Branches spreading. Leaves petioled, 2–3 in. long, ovate or oblong, obtuse, coriaceous, turning black when dry. Flowers silky,  $\frac{1}{4}$  in. long, in short, 3-chotomous, capitate panicles; bracts 3, ovate, silky. Style 0, or short.—*A. resinifera*, Forst. Prodr.

**Northern** Island: from the Thames river northward. **Chatham** Island, *Dieffenbach*. Forster erroneously supposed that this plant yielded an edible (?) gum, whence his name *A. resinifera*: it is abundant in Australia and throughout Asia, and very nearly related to the American species, if not a form of it.

4. **MYOPORUM**, Banks and Solander.

Shrubs, glabrous; branches sometimes viscid at the tips. Leaves alternate, quite entire or serrate, studded with pellucid glands. Flowers axillary, soli-



tary or fascicled, white or purplish.—Calyx equal, 5-partite. Corolla campanulate; tube short; limb 5-lobed, lobes nearly equal 2 upper approximate. Stamens 4, nearly equal; anthers 2-celled, cells becoming confluent. Ovary ovoid, 2-5-celled; style slender, stigma obtuse; ovules usually solitary when the cells are more than 2, geminate in each cell when these are only 2. Drupe ovoid, 2-5-celled; cells 1- rarely 2-seeded. Seeds pendulous; albumen scanty, fleshy; embryo terete; radicle superior.

A large Australian and Pacific Island genus.

1. *M. lætum*, Forst.;—*Fl. N. Z.* i. 204. A shrub or small glabrous tree, 8-10 ft. high. Leaves 2-4 in. long, lanceolate or obovate-lanceolate, acute or acuminate, serrulate above the middle, narrowed into petioles, bright green and lucid. Flowers 2-6 in a tuft; peduncle  $\frac{1}{3}$ - $\frac{2}{3}$  in. long. Sepals subulate or narrow-lanceolate, variable in size. Corolla  $\frac{1}{3}$ - $\frac{2}{3}$  in. broad; lobes rounded, villous inside. Drupe  $\frac{1}{4}$  in. long.—*Cytharexylon perforatum*, Forst.

**Northern** and **Middle** Islands: common on the shores, as far south as Otago. **Kermadec** Islands, *M. Gillivray*. Very closely allied to the Norfolk Island *M. obscurum* but the calyx is smaller. Kermadec Island specimens, however, are intermediate in this respect. It is also very near *M. serratum* of Tasmania, and some Pacific Island species.

Of Forster's *M. pubescens* nothing is known; it may be a *Scavola*.

## ORDER LVII. LABIATÆ.

Herbs or shrubs, usually aromatic. Leaves opposite, rarely whorled. Flowers in small, sessile or stalked, opposite axillary cymes, or solitary or whorled, rarely paniced racemose or spiked, regular or irregular.—Corolla-tube usually long and cylindric or funnel-shaped; limb often 2-lipped. Stamens 2 or 4, inserted on the tube of the corolla, alternating with its lower lobes. Ovary 4-lobed, 2-4-celled; style filiform, stigma 2-fid; ovules 1 in each lobe, erect. Fruit of 4 small nuts enclosed in the calyx. Albumen little or 0; cotyledons flat.

A very large Order in most parts of the world, except the coldest, to which the Mint, Sage, Horehound, etc. belong. It is singularly rare in New Zealand.

Calyx nearly equal. Stamens equal . . . . . 1. MENTHA.  
Calyx 2-lipped. Stamens didynamous . . . . . 2. SCUTELLARIA.

### 1. MENTHA, Linn.

Herbs, erect or procumbent, aromatic when bruised. Flowers solitary or in few- or many-flowered axillary whorled cymes. Bracts subulate.—Calyx tubular or campanulate, 5-toothed; throat naked or villous. Corolla-tube short, included in the calyx; limb equally 5-lobed or 2-lipped, the upper lip larger often 2-lobed. Stamens 4, equal, straight, erect; anther-cells 2, parallel. Style 2-fid at the tip. Nuts dry, smooth.

A very large European and Oriental genus, comparatively rare in other parts of the world. Several English species, as the Water-Mint, *M. aquatica*, L.; Peppermint, *M. piperita*, Sm.; Spearmint, *M. viridis*, L., etc., have been introduced into New Zealand.

1. *M. Cunninghami*, Benth.;—*Fl. N. Z.* i. 205. A fragrant, prostrate,

slender, diffusely branched, wiry herb; branches 2–10 in. long, often matted, pubescent. Leaves sessile or petioled,  $\frac{1}{6}$ – $\frac{1}{2}$  in. long, rounded or oblong-ovate, obtuse, quite entire, covered with pellucid dots. Flowers solitary, axillary, on short or long, slender pedicels. Calyx  $\frac{1}{10}$ – $\frac{1}{8}$  in. long, campanulate, villous externally, and on the teeth internally. Corolla lobes short. Stamens included in the corolla-tube of some flowers, exserted in others.—*Micromeria Cunninghamii*, Benth.

**Northern** and **Middle** Islands: abundant in rather dry places from the Bay of Islands to Otago, *Banks* and *Solander*, etc.

## 2. SCUTELLARIA, Linn.

Herbs or shrubs. Flowers racemed or whorled in the upper pairs of leaves. Bracts obscure or 0.—Calyx campanulate, 2-lipped; lips entire, upper with a flat shield or scale adnate to its upper surface, closed after flowering. Corolla-tube exserted, dilated above; limb 2-lipped, upper lip entire or notched, lower dilated 3-lobed. Stamens 4, exserted; anthers meeting in pairs, of longer stamens with unequal cells. Ovary on a long or short curved pedicel. Nuts dry, tubercled.

A very large genus, found in almost all quarters of the world.

1. **S. novæ-Zelandiæ**, Hook. f. *Fl. N. Z.* ii. 335. *S. humilis*, i. 205, not of Brown. A slender, sparingly branched, nearly glabrous herb, 6–12 in. high. Stem square, suberect or ascending. Leaves small, in distant pairs,  $\frac{1}{8}$ – $\frac{1}{2}$  in. long, petioled, ovate orbicular or subreniform, obscurely 3–5-lobed or crenate or quite entire, petioles  $\frac{1}{4}$ –1 in. long. Flowers in opposite pairs in the axils of the uppermost leaves; peduncles stout,  $\frac{1}{2}$ – $\frac{1}{6}$  in. long. Calyx short, puberulous; lips obtuse, rounded, scale shorter than the upper lip, but becoming much larger in fruit. Corolla  $\frac{1}{4}$  in long; lobes of lips short and obtuse, villous. Anthers all glabrous.

**Middle** Island: Nelson, *Bidwill*; Fox Hill, *Munro*. Closely allied to the Australian *S. humilis*, Br.

Of *Plectranthus australis*, Br., an Australian and Pacific Island plant, introduced into Raoul's 'Choix de Plantes,' I know nothing.

## ORDER LVIII. PLANTAGINÆ.

Herbs, with radical tufted leaves, rarely having leafy stems. Flowers solitary or spiked on slender leafless scapes, inconspicuous, green or brown.—Sepals 4. Corolla scarious; tube cylindric; lobes 4, spreading, with incurved margins. Stamens 4, long, inserted on the corolla-tube, alternating with its lobes; anthers versatile. Ovary 1, 2- or 4-celled; style long, filiform, stigma downy; ovules 1–6 in each cell, inserted on the septum. Capsule usually bursting transversely. Seeds peltate; albumen dense; embryo generally cylindric.

A small Order, widely diffused.

### 1. PLANTAGO, Linn.

Herbs, with usually ribbed, rosulate, radical leaves. Scapes few- or many-flowered. Flowers usually densely spiked, green, hermaphrodite.—Sepals

with broad, membranous margins. Capsule bursting across the middle. Seeds attached to either face of a free longitudinal septum, sessile, peltate.

A large genus, found in all temperate and many tropical countries, including the Plantains and other common weeds.

*Scapes* 1-3, rarely 4-5-flowered.

- |  |                         |
|--|-------------------------|
| Small. Leaves villous at the base. Scape 1-flowered. Bracts and sepals acute . . . . .   | 1. <i>P. uniflora</i> . |
| Small. Leaves nearly glabrous. Scape 3-5-flowered. Bracts and sepals obtuse . . . . .    | 2. <i>P. Brownii</i> .  |
| Small. Leaves very villous. Scape 2- or 3-flowered. Bracts and sepals subacute . . . . . | 3. <i>P. lanigera</i> . |

*Scapes many-flowered. Flowers spiked.*

- |   |                            |
|---|----------------------------|
| Spikes $\frac{1}{2}$ -1 in. long. Bracts and sepals pilose and ciliated . . . .             | 4. <i>P. spathulata</i> .  |
| Spikes $\frac{1}{4}$ - $\frac{3}{4}$ in. Scapes slender. Bracts and sepals glabrous . . . . | 5. <i>P. Raoulia</i> .     |
| Spikes 1-6 in. Scapes stout. Bracts and sepals glabrous . . . .                             | 6. <i>P. Aucklandica</i> . |

1. ***P. uniflora*, Hook. f. Fl. N. Z. i. 207.** Stems short, stout,  $\frac{1}{4}$  in. high, tufted (?), villous at the crown. Leaves few,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, narrow-lanceolate, sinuate-toothed or quite entire, glabrous, villous at the base; nerve 1, obscure. Scape slender, as long as the leaves, 1-flowered, hairy. Sepals linear-oblong, acute, longer than the lower half of the capsule.

**Northern Island:** top of the Ruahine range, *Colenso*. Very near *P. Brownii*, of which it may be a variety, but the leaves are narrower, scapes more slender, flowers solitary, and sepals narrower and more acute. My specimens are indifferent and past flower.

2. ***P. Brownii*, Rapin.—*P. carnosa*, Br.;—Fl. N. Z. i. 207.** A small, tufted, rather fleshy species; root stout. Leaves very numerous, rosulate,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, lanceolate or oblong-lanceolate, acute, sinuate-toothed, glabrous or pilose, often villous at the base or in patches on the upper surface. Scapes stout, erect or prostrate, numerous, as long as or longer than the leaves, pilose, 3-5-flowered. Flowers in a small, dense head. Bracts and sepals broadly oblong, obtuse, nearly glabrous, with fleshy keel. Capsule short; cells 2-4-seeded.—Fl. Antarct. i. 65, t. 43.

**Northern Island:** summits of the Ruahine mountains, *Colenso*. **Middle Island:** hills and valleys, Hurumui, alt. 1200-1600 ft., *Travers*. **Lord Auckland's group:** on maritime rocks, common, *J. D. H.* Closely allied to the Antarctic American *P. pauciflora*, Lamb., but the habit is different. This is a common Tasmanian plant. The Auckland Island specimens have foliage nearly glabrous; the Ruahine mountain ones present patches of villous hairs on the upper surface of the leaves; the Tasmanian individuals are intermediate in this respect; *Travers's* specimens are broader-leaved, and resemble small states of *P. spathulata* in foliage. This, like the *P. maritima* and *P. Coronopus* of Europe, inhabits both the mountain-tops and sea-level; *P. paradoxica*, Hook. f., of Tasmania, is probably another state of it; *P. barbata*, Forst., of Fuegia, is its American representative.

3. ***P. lanigera*, Hook. f., n. sp.** Leaves densely rosulate, oblong-lanceolate, subacute, sessile, quite entire,  $\frac{1}{2}$ -1 in. long, above densely woolly with matted, white, tortuous, jointed hairs, below glabrous or nearly so. Scapes short, inclined, tomentose, 1-3-flowered at the top. Bracts and sepals ovate-oblong, subacute.

**Middle Island:** Otago, lake district, in rocky alpine places, alt. 6000 ft., *Hector and Buchanan*. The flowers are long past in my specimens, in *Buchanan's* drawing they are large, the corolla much exceeding the calyx.

4. ***P. spathulata*, Hook. f. Fl. N. Z. i. 208.** Glabrous or villous with

weak, jointed, soft hairs. Leaves all radical, horizontally spreading, 1-4 in. long, spathulate or oblong- or lanceolate-spathulate, fleshy, quite entire or sinuate or toothed, petioles villous at the base. Scapes several or numerous, villous or pilose; spikes oblong, cylindric, obtuse, dense- and many-flowered,  $\frac{1}{2}$ -1 in. long. Bracts and sepals  $\frac{1}{10}$ - $\frac{1}{8}$  in. long, ovate, acute, with thick midrib, pilose and ciliate. Corolla-lobes ovate, acute. Stamens and style moderately long. Anthers large. Capsule short; cells 2-seeded.

**Northern** Island: east coast, near Pahawa, in gravel, rocks, and sand, *Colenso*. **Middle** Island: terraces and river beds in the Kowai valley, *Haast*. The spikes are sometimes compound.

5. **P. Raoulii**, *Decaisne*;—*Fl. N. Z.* i. 208. Pilose or almost hispid or villous. Leaves all radical, horizontally spreading, 2-10 in. long, rather flaccid, linear- or oblong-lanceolate, acute, coarsely irregularly sinuate-toothed. Petioles villous at the base. Scapes slender, few or numerous, pilose. Spikes cylindric,  $\frac{1}{4}$ - $\frac{3}{4}$  in. long, obtuse, densely many-flowered. Bracts and sepals  $\frac{1}{12}$  in. long, broadly ovate, obtuse, glabrous, with broad fleshy keel. Corolla-lobes very small. Capsule twice as long as the calyx, acute; cells 2-seeded.—*P. varia*, A. Cunn., not Brown.

**Northern** and **Middle** Islands: abundant in pastures and waste grounds. This is a representative of the common Australian *P. varia*.

6. **P. Aucklandica**, *Hook. f. Fl. Antarct.* i. 65, t. 42. Rhizome fleshy, stout, as thick as the thumb. Leaves densely crowded, 1-3 in. long, broadly ovate, obtuse, glabrous, fleshy, obscurely sinuate or quite entire, 7-10-nerved; petioles very short, broad, densely villous or woolly at the base. Scapes numerous, longer than the leaves, very stout, hairy. Spikes 1-6 in. long. Flowers small, crowded above the middle of the spike, in scattered tufts below it. Bracts and sepals  $\frac{1}{6}$ - $\frac{1}{2}$  in. long, broadly ovate, obtuse, glabrous, with broad fleshy centre. Corolla-lobes small, linear-oblong. Capsule twice as long as the sepals, acute; cells 1-seeded.

**Lord Auckland's** Island: common on the hilltops, in wet places, *J. D. H.*

Two European species of *Plantago* are now naturalized in New Zealand, viz. *P. major*, Linn., with large ovate or subcordate, long-petioled, 5-9-ribbed leaves, and a very long spike; and *P. lanceolata*, Linn., also a large species, with lanceolate, 5-7-ribbed leaves, and short, stout, dense-flowered spikes. Both are troublesome weeds in pastures.

## ORDER LIX. NYCTAGINEÆ.

Trees shrubs or herbs. Leaves usually opposite, quite entire, exstipulate. Flowers usually hermaphrodite, often paniced.—Perianth tubular or funnel-shaped, 5-lobed, persistent, closing over the fruit. Stamens 1 or more, hypogynous, free or united at the base, equal or unequal. Ovary free, 1-celled; style filiform, stigma lobed or capitate; ovule 1, erect. Utricle enclosed in the hardened perianth-tube. Seed usually long; embryo with foliaceous cotyledons coiled round mealy albumen.

An Order of no great extent or importance, chiefly tropical, containing the common garden *Mirabilis*, or "Marvel of Peru."



1. **PISONIA**, Linn.

Trees or shrubs. Leaves opposite alternate or whorled, exstipulate. Flowers in terminal cymes or corymbs, green or reddish, usually small.—Flowers hermaphrodite or unisexual, with minute bracts at the base. Perianth cylindrical-campanulate; lobes 5, small, plaited. Stamens 6–10, included or exerted, unequal. Ovary elongate; style lateral or terminal, stigma entire lobed or plumose. Utricle enclosed within the thickened, smooth or costate, glabrous aculeate or glandular perianth.

A considerable genus, of chiefly littoral plants, found in tropical and subtropical parts of the world.

1. **P. Brunoniana**, Endl. *Prodr. Flor. Ins. Norf.* 43.—*P. Sinclairii*, Fl. N. Z. i. 209. t. 50. A small tree, 12–15 ft. high, glabrous. Leaves opposite or 3 in a whorl, 4–12 in. long, broadly oblong, obtuse or acute, quite entire, flaccid. Cymes compound, pubescent, 2–4 in. broad. Perianth pedicelled, pubescent,  $\frac{1}{6}$  in. long. Stamens 7, included. Style terminal, stigma cordate. Perianth of the fruit ribbed, viscid, 1–1½ in. long.

**Northern Island**: east coast, near Ngunguru, *Colenso*; Wangarei harbour, *Sinclair*. This, which is also a native of Norfolk Island and Eastern Australia (*P. Moorei*, Muell.), is very near the Pacific island and Javanese *P. inermis*, Forst. (*P. Forsteriana*, Endl.; *P. excelsa*, Blume), but the perianth is longer, with shorter lobes, and the stamens are included. In De Candolle's 'Prodromus' these species and their synonymys are in confusion.

ORDER LX. **CHENOPODIACEÆ.**

Herbs, rarely shrubby, usually flaccid or fleshy. Leaves alternate or 0; stipules 0. Flowers small, regular, often in small clusters, but very variously disposed, not rarely unisexual.—Perianth 2- or 4- or 5-lobed or -cleft, imbricate, herbaceous, persistent. Stamens 1–5, perigynous, opposite the lobes, free or united at the base. Ovary free, 1-celled; styles 2–5, stigma acute; ovule 1, usually pendent from a basilar cord. Nut or utricule small, 1-seeded, enclosed in the perianth. Seed orbicular or reniform, flattened, erect or horizontal; embryo terete, coiled round mealy albumen, or spiral and without albumen.

A very large Order, including many saline plants, very difficult of determination.

Stems leafy, not jointed.

Perianth ebracteate, 3–5-parted, not altered in fruit. Embryo annular . . . . .	1. CHENOPODIUM.
Perianth bracteolate, 5-parted, fleshy in fruit. Embryo spiral . . . . .	2. SUÆDA.
Female fl. enclosed in 2 bracts, which are much enlarged in fruit . . . . .	3. ATRIPLEX.
Perianth bracteate, 5-parted, winged or keeled in fruit. Embryo spiral . . . . .	4. SALSOLA.
Stems leafless, cylindrical, jointed. Flowers sunk in the joints . . . . .	5. SALICORNIA.

1. **CHENOPODIUM**, Linn.

Herbs, often powdery or glandular. Leaves alternate, rarely opposite, entire toothed or lobulate. Flowers very small, greenish, in small subglobose

fascicles, often subspicate.—Flowers without bracts, hermaphrodite or unisexual. Perianth 3–5-parted, not enlarged in fruit. Stamens 1–5. Ovary globose or depressed; styles 2 or 3. Utricle depressed or erect. Seed horizontal or erect; embryo surrounding mealy albumen.

A very large, ubiquitous genus, comprising many weeds of waysides, dunghills, and cultivated grounds, several of which are no doubt introduced into New Zealand.

§ 1. *Seed horizontal, rarely vertical in C. glaucum.*

- |  |                             |
|--|-----------------------------|
| Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in., quite entire, glaucous and pulverulent . . . . . | 1. <i>C. triandrum</i> .    |
| Leaves 1–1½ in., triangular, toothed, not glaucous . . . . .                               | 2. <i>C. urbicum</i> .      |
| Leaves $\frac{1}{2}$ –1 in., oblong or deltoid, mealy below . . . . .                      | 3. <i>C. glaucum</i> .      |
| Leaves 1–2 in., glandular, aromatic, not glaucous . . . . .                                | 4. <i>C. ambrosioides</i> . |

§ 2. *Seed vertical. (See glaucum in § 1.)*

- |   |                          |
|---|--------------------------|
| Tall, erect. Perianth-segments much thickened . . . . .           | 5. <i>C. carinatum</i> . |
| Small, much-branched, very slender. Perianth membranous . . . . . | 6. <i>C. pusillum</i> .  |

1. **C. triandrum**, *Forst.*;—*Fl. N. Z.* i. 212. A small, much-branched, pulverulent herb, 6–12 in. high; branches very slender. Leaves opposite and alternate,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, with slender petioles, oblong-hastate, truncate cordate or cuneate at the base, rounded at the tip, quite entire. Flowers very minute, in axillary spikelets, and fascicled towards the ends of the branches. Fruiting perianth open. Stamens 2–4. Seed punctate, adhering to the utricule.

**Northern** and **Middle** Islands, from Auckland to Otago, frequent, *Banks and Solander*, etc. Apparently confined to New Zealand. (The plant bearing this name in A. Cunningham's Herbarium is *Eurotus viridis*.)

2. **C. urbicum**, *Linn.*;—*Fl. N. Z.* i. 213. A tall, erect or prostrate, coarse, branching, green herb, 2–3 ft. high, quite glabrous, not glaucous nor pulverulent; stems angled. Leaves 1–1½ in. long, with slender petioles, triangular or subcordate-hastate, margin irregularly notched, crumpled, lobulate. Flowers in dense axillary and terminal spikes. Seed punctate; margins obtuse.

**Northern** Island: Tanenuiarangi, *Colenso*. **Middle** Island: New River, *Hb. A. Richard*; Ashburton river and Rangitata range, *Haast*. A common weed and wayside plant in many parts of the world, perhaps not indigenous to New Zealand.

3. **C. glaucum**, *Linn.*, var. **ambiguum**;—*Fl. N. Z.* i. 213. Prostrate, much-branched, succulent; stems and branches 4–18 in. long, flaccid, glabrous. Leaves  $\frac{1}{2}$ –1 in. long, lower petioled, upper sessile, ovate-oblong trapezoid or subhastate, quite entire lobulate or coarsely unequally toothed, obtuse, pulverulent below. Spikes short, glomerate, axillary. Perianth 3–5-parted. Seed erect or horizontal, punctate.—*C. ambiguum*, Br.

**Northern** and **Middle** Islands: not uncommon on muddy flats, shingle, etc., near the sea, *Banks and Solander*, etc. A common extratropical plant in the southern and also abundant in the northern hemisphere.

4. **C. ambrosioides**, *Linn.*;—*Fl. N. Z.* i. 213. Tall, erect, branched, herbaceous, 1–3 ft. high, glabrous or pubescent, everywhere glandular, very aromatic; stems and branches terete. Leaves 1–2 in. long, ovate- or oblong-lanceolate or lanceolate, acuminate, cuneate at the base, shortly petioled, coarsely obtusely or acutely toothed and cut. Flowers on short, axillary, spiciform, leafy branches. Stamens usually 5. Seed horizontal.

**Northern** Island: cultivated ground, *Colenso*, perhaps introduced. **Middle** Island:

Otago, Waitaki valley and lake district, *Hector and Buchanan*. An abundant tropical and subtropical weed; the seeds are described as sometimes vertical.

5. **C. carinatum**, Br.;—*Fl. N. Z.* i. 213. A branched, erect, glandular-pubescent, strong-scented herb; stem 1–2 ft. high. Leaves petioled, small,  $\frac{1}{4}$ –1 in. long, ovate-oblong, obtuse, sinuate-toothed. Flowers very minute, copious, in axillary glomerules, green. Perianth-segments 5, incompletely covering the fruit, oblong, with prominent, thick, but not succulent back. Stamen 1. Seed erect, compressed, brown, minutely punctate.—*C. Botrys*, A. Cunn. not Linnæus.

**Northern** Island: Bay of Islands, *Cunningham*, etc.; Auckland, *Sinclair*. I have seen no authentic Australian specimens of *C. carinatum*, Br., but suppose this to be it; it is the *C. glandulosum*, Moq. Tand., also a native of Australia.

6. **C. pusillum**, Hook. f., n. sp.—*C. Pumilio*, Br.; *Fl. N. Z.* i. 214. A small, much-branched, pubescent and glandular plant; stem very short; branches 3–6 in. long, very slender, leafy. Leaves petioled,  $\frac{1}{12}$ – $\frac{1}{8}$  in. long, oblong-ovate, obtuse, quite entire or obscurely sinuate, pubescent on both surfaces. Flowers in very minute axillary glomerules. Perianth 3–5-cleft, membranous, segments not thickened, not closing over the fruit. Stamen 1. Seed very minute, erect, compressed, brown, minutely punctate.

**Northern** Island: shores of the east coast and sandy shores of Lake Taupo, abundant in native cultivated ground, *Colenso*. This differs from Brown's *C. Pumilio* in the membranous perianth-segments.

## 2. SUÆDA, Forskal.

Erect or prostrate, succulent herbs, sometimes shrubby at the base. Leaves terete, fleshy. Flowers minute, clustered in the axils of the leaves, hermaphrodite; bracts 2, minute.—Perianth urceolate, 5-partite, fleshy, tumid in fruit. Stamens 5. Ovary truncate; styles 2–5. Utricle compressed, included in the tumid perianth. Seed free, vertical or horizontal; albumen little or 0; embryo spiral.

A small genus of chiefly maritime plants, scattered over the globe.

1. **S. maritima**, Dumortier;—*Fl. N. Z.* i. 316. Erect, branched, perfectly glabrous; stem shrubby at the base; branches slender. Leaves sessile,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, subcylindric, linear, glabrous or farinose. Utricle membranous. Seed punctate, horizontal or oblique; margin rather acute.—*Chenopodium australe*, Br.; *C. maritimum*, A. Cunn.; *Salsola fruticosa*, Forst.

**Northern** and **Middle** Islands: not uncommon in maritime swamps, muddy shores, etc., as far south as Otago, *Banks and Solander*, etc. A frequent plant on most temperate and many tropical coasts.

## 3. ATRIPLEX, Linn.

Herbs or shrubs, often fleshy, sometimes scaly or powdery.—Flowers small, green, crowded in clusters, which are axillary or sessile on the terminal naked tips of the branches, unisexual. *Male* ebracteate. Perianth 3–5-parted. Stamens 3–5. Ovary rudimentary. *Female* 2-bracteate. Perianth 0 or 5-partite. Ovary small; styles 2, united at the base. Bracts in the fruit much enlarged, erect, dilated, closely pressed together and enclosing the utricule. Seed horizontal; albumen farinaceous; embryo annular.

A large genus, abounding in shores and waste places of temperate (more rarely in tropical) regions.

Plants covered with white scales . . . . . 1. *A. cinerea*.  
 Glabrous or powdery, erect. Fruiting bracts rhomboid . . . . . 2. *A. patula*.  
 Glabrous, fleshy, and papillose. Fruiting bracts urceolate . . . . . 3. *A. Billardieri*.

1. ***A. cinerea*, Poiret**;—*Fl. N. Z.* i. 214. A small shrub, 1–4 ft. high, everywhere covered with white glistening scales; branches angled, leafy. Leaves 1–2 in. long, narrow-oblong, obtuse, entire, narrowed into short petioles. *Male* fl.: clustered in dense globose or oblong spikes, which are panicked at the ends of the branches. *Female* fl.: axillary, clustered or solitary. Bracts of fruit  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, broadly ovate, obtuse, corky, with thin margins.—*A. Halimus*, Br. Prodr. not Linn.

**Northern** Island: sandy shores of Palliser Bay, *Colenso*. **Middle** Island: Canterbury, *Haast* (nearly glabrous; leaves sinuate, perhaps different, but specimen imperfect). An abundant Australian and Tasmanian plant. Closely allied to the European *A. Halimus*, L.

2. ***A. patula*, Linn.**;—*Fl. N. Z.* i. 215. A glabrous or slightly powdery, usually tall and erect, branched, leafy herb, 2–4 ft. high; stems terete. Leaves 1–3 in. long, shortly petioled, narrow ovate oblong or hastate, quite entire or lobed, rarely laciniate, subacute or obtuse, uppermost often linear. Flowers in spikes, which are axillary, and terminate the slender branches. *Female* bracts  $\frac{1}{10}$  in. diam., rhomboid in fruit, toothed, their back smooth or tubercled.

**Northern** Island: salt marshes on the east coast, plentiful, *Colenso*. Abundant in Australia, Tasmania, and many other parts of the old world.

3. ***A. Billardieri*, Hook. f.** *Fl. N. Z.* i. 215. A prostrate, branched, glabrous, succulent, papillose herb; stems angled, 6–12 in. long; branches ascending. Leaves small,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, oblong, obtuse, entire or sinuate, shortly petioled. *Male* fl.: fasciated, shortly pedicelled; *female*: solitary or 2 together, sessile; bracts combined into an urceolate, 2-lipped, fleshy cup, enclosing an erect utricle. Utricle nearly orbicular, with 2 rather slender styles. Seed erect, compressed, its edges opposite the 2 bracts (not parallel, as is usual in the genus).—*Theleophyton Billardieri*, Moq.-Tand. in A. DC. Prodr.

**Northern** Island, *A. Cunningham*; sandy places, Wangururu Bay, *Colenso*. A native of Tasmania.

#### 4. **SALSOLA**, Linn.

Shrubs, or rigid, often spinescent herbs. Leaves small, subcylindric, fleshy, or rigid and pungent.—Flowers small, axillary, sessile, hermaphrodite, 2-bracteate. Perianth 4- or 5-partite, segments dilating greatly, closing over the fruit, and becoming transversely ridged, or membranous and broadly winged. Stamens 5; filaments often united at the base. Ovary depressed; styles 2. Seed horizontal; albumen 0; embryo spiral.

A large genus, especially in the saline districts, inland and maritime, of the temperate and subtropical regions of the globe.

1. ***S. australis*, Br.?**—*Fl. N. Z.* i. 216. A rigid, woody, low, sub-erect or prostrate, much-branched plant, 1–2 ft. high; stems and branches



ribbed, rather rough. Leaves small,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, scattered, patent or recurved, rigid, ovate or broadly subulate, pungent. Flowers very inconspicuous, shorter than the bracts. Perianth 5-parted, segments after flowering expanded into a broad, horizontal, membranous, veined wing.

**Northern** Island: gravelly shores of Port Nicholson harbour, *Colenso*, who observes that it is perhaps introduced. A native of Australia, and very closely related to the common European *S. Kali*. My only specimen has shorter leaves than the Australian plant, which is sometimes pilose; it has not ripe fruit. I have from Canterbury what appear to me to be seedlings of this, sent by Mr. Travers.

### 5. SALICORNIA, Linn.

Herbs or shrubs; stems leafless, succulent, jointed.—Flowers minute, sometimes in approximate short joints, which form a sort of cone at the end of the branch, hermaphrodite, ebracteate, hidden in or between the tops of the joints of the stem. Perianth fleshy, turbinate. Stamens 1 or 2. Ovary ovoid; styles 2. Utricle compressed, included in the perianth. Seed vertical; albumen usually scanty; embryo annular or conduplicate.

Maritime or salt lake plants, found in all parts of the world.

1. *S. indica*, Willd. ?;—*Fl. N. Z.* i. 216. Stems prostrate, 3–6 in. long, rather woody; branches ascending, 2–6 in., terminated by cylindrical cones. Joints very variable in length,  $\frac{1}{3}$ – $\frac{1}{2}$  in., rather compressed, dilated at the tip and obscurely 2-lobed, about as thick as a small quill. Cones  $\frac{1}{3}$ –2 in. long, rather thicker than the branches. Flowers numerous, sessile, whorled in the axils of the short joints of the cone. Perianth urceolate, fleshy, truncate, with a small central orifice. Stamen, 1 only seen. Fruiting perianth obpyramidal, with a flat top and closed orifice. Utricle membranous. Seed flattened, nearly orbicular; testa papillose, rather thick; albumen 0; embryo with very thick, plano-convex, pyriform cotyledons, and incumbent terete radicle.—*S. australis*, Forst.

**Northern** and **Middle** Islands; abundant on muddy shores and in sandy and rocky places, *Banks* and *Solander*, etc. This appears to be the same as the Indian plant figured in Wight's 'Icones,' t. 757, and quoted by Moquin-Tandon, and which is also found in Tasmania and Australia. The structure of the flower and fruit wants careful re-examination on living specimens. It does not agree with any description in Moquin's monograph of the genera in A. DC.'s 'Prodromus,' but is, I suppose, referable to his genus *Arthrocnemon*.

## ORDER LXI. AMARANTHACEÆ.

Herbs, rarely shrubby. Leaves opposite or alternate; stipules 0.—Floral characters of *Chenopodiaceæ*, but the perianth is usually membranous or scarious, of 5 distinct leaflets; the stamens are most often united into a membranous cup with membranous expansions between the filaments, and the anthers are 1-celled in many. One tribe of the Order has several ovules in the ovary.

A large tropical and subtropical Order, including a few weeds of cultivation, as *Amaranthus* (*Eurotus*) *viridis*, which Cunningham has, under the name of *Chenopodium triandrum*, from the Bay of Islands; it resembles a *Chenopodium*, but has acute bracts and perianth-leaflets, and a minute hard nut-like fruit.

1. **ALTERNANTHERA**, Forskal.

Herbs, rarely shrubs; stems often branched, jointed, rooting. Leaves opposite. Flowers minute, white, in axillary or terminal clusters, 3-bracteate.—Perianth 5-parted, erect. Stamens 5; filaments united in a membranous cup; anthers 3–5, 1-celled; style very short, stigma 2-fid or capitate. Utricle erect, compressed, included in the perianth. Seed vertical, compressed.

A rather large tropical and subtropical genus.

1. **A. sessilis**, Br.;—*Fl. N. Z.* i. 212. Stems much branched from the root, herbaceous, prostrate, 2–6 in. long, with 2 lines of pubescence. Leaves  $\frac{1}{2}$ –1 in. long, narrow obovate or oblong, obtuse, rather fleshy, pubescent in the axils. Flowers minute, white. Perianth-segments acuminate, glabrous. Anthers, 3 fertile, 2 imperfect.—*A. denticulata*, A. Cunn.

**Northern** Island: not unfrequent in boggy places. A very common tropical and sub-tropical weed in the old world, and very variable.

ORDER LXII. **PARONYCHIEÆ**.

Herbs, often small. Leaves opposite or alternate, stipulate or exstipulate. Inflorescence various. Flowers small, regular, hermaphrodite.—Perianth 4- or 5-lobed or partite, persistent, and enclosing the fruit. Stamens 1–10, perigynous or hypogynous; filaments subulate; anthers small, 2-celled. Ovary ovoid, free, sessile, 1-celled; style 1, terminal, 2- or 3-fid, stigmas capitate or subulate; ovule 1, erect. Utricle or nut included in the persistent calyx, 1-seeded. Seed erect or pendulous from a basilar funicle; testa coriaceous; embryo usually annular, surrounding farinaceous albumen.

A small Order, scattered all over the globe.

1. **SCLERANTHUS**, Linn.

Small, densely tufted, dichotomously branched, rigid herbs. Leaves connate by their base in opposite pairs, subulate, pungent, exstipulate. Flowers minute, solitary in pairs or cymose.—Perianth very coriaceous, 4- or 5-fid, very hard in fruit. Stamens 1–10, perigynous. Style 2-fid. Ovule pendulous from a basilar funicle. Embryo annular.

A small genus found in the temperate regions of both hemispheres.

1. **S. biflorus**, Hook. f. *Fl. N. Z.* i. 74. A very densely branched, mossy, rigid herb, 1–2 in. high, forming compact tufts. Leaves closely imbricated,  $\frac{1}{10}$ – $\frac{1}{2}$  in. long, subulate, serrulate. Flowers in pairs, with 4 bracts at their base placed crosswise, at length carried up on a short, rigid peduncle. Perianth 4-fid. Stamen 1.—*Mniarum biflorum*, Forst.; *M. pedunculatum*, Labill. *Fl. Nov. Holl.* t. 2; *M. fasciculatum*, Raoul, not Br.; *Ditoca muscosa*, Banks and Solander.

Dry, rocky, and sandy places throughout the islands, *Banks and Solander*, etc. Also found in Tasmania and Australia.

# ORDER LXIII. POLYONEÆ.

Herbs or shrubs. Leaves alternate, entire; stipules membranous, tubular, often lacerated. Flowers regular, small, solitary, spiked racemed or paniced.—Perianth 5- or 6-partite, imbricate, persistent, enclosing the fruit. Stamens usually 6-9, perigynous. Ovary free, 1-celled; styles 1-3, stigmas capitate; ovule 1, erect. Fruit a usually compressed or 3-gonous nut enclosed in the dry or fleshy, often enlarged perianth. Seed filling the nut; embryo cylindric, straight or curved; albumen mealy.

A very large tropical and temperate genus, containing various European weeds that may be expected to occur in New Zealand, besides the Buckwheat.

- |   |                  |
|---|------------------|
| Flowers hermaphrodite. Perianth not succulent in fruit . . . . .  | 1. POLYGONUM.    |
| Flowers unisexual. Base of the perianth succulent in fruit . . . . .                                      | 2. MUHLENBECKIA. |
| Flowers hermaphrodite. Two or three inner lobes of perianth enlarged and closing over the fruit . . . . . | 3. RUMEX.        |

## 1. POLYGONUM, Linn.

Herbs, rarely shrubs; prostrate or erect, simple or branched. Flowers white or red, small, racemed spiked or axillary and solitary, spikes rarely paniced.—Flowers hermaphrodite. Perianth 5-partite, persistent. Stamens usually 6-8, rarely fewer. Ovary 3-gonous or compressed; styles 2 or 3, very short. Nut 3-gonous or compressed, included in or protruding from the withered, dry perianth.

A very large, tropical and temperate genus.

- |  |                          |
|--|--------------------------|
| Flowers spiked. Nut flattened . . . . .                | 1. <i>P. minus</i> .     |
| Flowers axillary, 1-3 together. Nut 3-gonous . . . . . | 2. <i>P. aviculare</i> . |

1. ***P. minus*, Huds., var. *decipiens*;—*P. prostratum*, A. Cunn.;—Fl. N. Z. i. 209, not Br.** Stems herbaceous, prostrate at the base or suberect, glabrous or pilose, simple or sparingly branched. Leaves scattered, 2-8 in. long, linear-lanceolate, acuminate, eglandular, margins scabrous; stipules long, brown, with ciliated aperture. Spikes long, slender, terminal, simple or compound, 1-2 in. long. Flowers small, not crowded, reddish,  $\frac{1}{2}$  in. long. Bracts truncate, glabrous or ciliate. Perianth lobes oblong, obtuse, eglandular, glabrous. Nut flattened, with obtuse edges.

**Northern and Middle Islands:** not uncommon, *Banks* and *Solander*, etc. This is a southern state of the common North-European *P. minus*; it entirely resembles *P. salicifolium*, Del., and *P. serrulatum*, Lag., except that the nuts are flattened and not 3-gonous; it abounds in Australia, tropical and subtropical India, Africa, and America, and is also found in Southern Europe; it differs from the typical *P. minus* in the more slender erect habit, and few, long, simple, long-peduncled spikes; it is the *P. decipiens*, Br., of Australia.

2. ***P. aviculare*, Linn.;—Fl. N. Z. i. 210.** Stems herbaceous, much branched, prostrate, woody at the base; branches spreading, 6-24 in. long, hard, wiry, grooved, rough or smooth. Leaves small, scattered, coriaceous,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, linear-oblong or sub lanceolate, obtuse or acute, margins recurved; stipules membranous, silvery, ragged, long or short. Flowers small, solitary or 2 or 3 together, axillary, pedicelled. Nut acute, 3-gonous, longer than the perianth.

Var.  $\beta$ . *Dryandri*.—*P. Dryandri*, Spr.; Fl. N. Z. i. 210. Smaller. Stipules shorter.

**Northern** Island: east coast, Ahuriri, *Colenso*. **Middle** Island: Akaroa, *Raoul*; var.  $\beta$ , east coast, Ruamahanga and Tuki-tukimiu, *Colenso*; Port Cooper, *Lyall*; Otago, covering acres of ground by roadsides, *Hector and Buchanan*. A very common plant in all temperate and some tropical parts of the world, perhaps introduced into New Zealand, where it is spreading with extraordinary rapidity.

## 2. MUHLENBECKIA, Meisn.

Shrubs and undershrubs, sometimes small, often rampant, and climbing with much-intertwined slender branches. Flowers small, whitish or greenish, spiked, or axillary and few or solitary; spikes sometimes paniced. Pedicels jointed below the perianth.—Flowers unisexual, monœcious or polygamous. Perianth 5-lobed, lower part becoming fleshy, often white in fruit. Stamens 8; filaments short; anthers oblong; very reduced thick and short in the female flowers with imperfect anthers. Ovary sessile, 3-gonous, with 3 very short, papillose or fimbriate stigmas. Nut ovoid, acuminate, 3-quetrous, black, enclosed in the perianth, whose basal part is succulent.

A small genus of Australian, New Zealand, and South American plants.

Leaves  $\frac{1}{2}$ –2 in. long, broad, ovate or cordate. Spikes paniced. . . . 1. *M. adpressa*.

Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, broad, ovate or cordate. Spikes usually simple. . . . 2. *M. complexa*.

Leaves  $\frac{1}{10}$ – $\frac{1}{4}$  in. long, orbicular or oblong. Flowers subsolitary. . . . 3. *M. axillaris*.

Leaves 0, or minute and narrow. Male flowers spiked, female often solitary. . . . . 4. *M. ephedroides*.

1. ***M. adpressa*, Lab.**;—*Polygonum australe*, A. Rich.;—Fl. N. Z. i. 210. A large, rambling and climbing, leafy bush, glabrous. Stem and branches often twining, flexuous, grooved; branchlets often minutely scaberrulous. Leaves  $\frac{1}{2}$ –2 in. long, petioled, cordate or broadly oblong and truncate at the base, obtuse acute or apiculate, glabrous, in young plants 3-lobed; stipules deciduous. Spikes paniced, many-flowered, glabrous; bracts obtuse, 1–3-flowered. Flowers small, unisexual. Stigmas plumose. Perianth fleshy in fruit. Nut 3-gonous, black.—*Coccoloba australis*, Forst.

Abundant throughout the islands, *Banks and Solander*, etc. Common in Norfolk Island, Australia, and Tasmania. *Meisner* (A. DC. Prodr. xiv. 146) distinguishes the New Zealand from the Australian plant by the stigmas plumose, not papillose, but I find the stigmas of the Australian plant to be the most plumose of the two. The Chilean *M. Chilensis*, Meisn., seems to be the same species.

2. ***M. complexa*, Meisn.**—*Polygonum complexum*, A. Cunn.;—Fl. N. Z. i. 210. Stems slender, prostrate or climbing over bushes, much interlaced, flexuous, scaberrulous or glabrous, grooved, 1–5 ft. long. Leaves petiolate, quite glabrous or puberulous at the base and on the petiole,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, broadly obovate-cordate or orbicular, often contracted in the middle, sometimes dotted below, rarely acute; stipules deciduous; petiole long or short. Spikes simple or paniced, sometimes very short and reduced to 1 or 2 flowers, glabrous pubescent or tomentose. Bracts obtuse, 1–6-flowered. Perianth fleshy in fruit. Stigmas papillose. Nut 3-gonous, black.

Throughout the islands, abundant, *Banks and Solander*, etc. Some large states of this seem to pass into *M. adpressa*, Lab., and small ones into *M. axillaris*.

3. ***M. axillaris*, Hook. f.**—*Polygonum axillare*, Hook. f. Fl. N. Z. i. 211. A small species, 1–6 in. high; quite glabrous, except the branchlets and petioles,



which are sometimes puberulous. Branches slender, tufted, spreading from a woody stock. Leaves small, petioled,  $\frac{1}{10}$ – $\frac{1}{4}$  in. long, elliptic-oblong, obtuse, flat, glabrous; stipules short, truncate. Flowers solitary, axillary, pedicelled. Stigmas papillose. Perianth fleshy in fruit.

**Northern** Island: Wairarapa valley, *Colenso*. **Middle** Island: abundant on the mountains, ascending to 6500 ft., *Bidwill*, etc. Much smaller than either of the preceding, and of a very different habit, but possibly only a mountain variety; it is excessively variable, and found also in the Australian and Tasmanian alps, where it attains a larger size.

4. **M. ephedroides**, *Hook. f.*—*Polygonum ephedroides*;—*Fl. N. Z. i.* 211. A shrubby, prostrate, diffusely branched, nearly leafless species. Stems 6 in. to 2–3 ft. long, rigid, wiry, rush-like, deeply grooved, the twigs scaberulous. Leaves none or few and scattered,  $\frac{1}{4}$ –1 in. long, petioled or sessile, linear, subacute, base often dilated or subhastate; stipules short, truncate. *Male* fl. in simple, axillary, lax, quite glabrous spikes, with a few female flowers intermixed;—*fem.* fl. often axillary and solitary. Stigmas fimbriate. Perianth rather fleshy in fruit.

**Northern** Island: east coast, near the sea at Ahuriri, *Colenso*. **Middle** Island: Otago, Lower Waitaki, *Hector* and *Buchanan*. A remarkable species, resembling *Rushes* scattered on the ground. I suspect that the *Polygonum Cunninghamii*, Meisner, which forms impassable thickets in some parts of Australia, is the same plant as this.

## 2. RUMEX, Linn.

Herbs, rarely almost shrubby. Leaves usually long. Flowers hermaphrodite, usually pedicelled, pendulous, small, green, whorled on branched spreading or close panicles.—Perianth of 6 pieces; 3 inner enlarging, dry, veined, and closing over the fruit. Styles 3, short, stigmas fimbriate. Nut small, usually 3-gonous, enclosed in the much enlarged, dry, often toothed or ciliate perianth.

A large genus, found in all temperate and many tropical parts of the world.

1. **R. flexuosus**, *Forst.*;—*Fl. N. Z. i.* 211. Prostrate, glabrous, diffusely branched, 1–2 ft. long; branches flexuous, deeply grooved. Leaves 4–8 in. long, narrow linear-oblong, plane or waved at the margin, obtuse or acute, base truncate acute or cordate, upper nearly sessile. Flowers in distant 3–8-flowered whorls, lower whorls leafy. Peduncles curved, as long as the fruiting perianth. Inner lobes of fruiting perianth  $\frac{1}{10}$  in. long, rhomboid, with long attenuated tips, veined, without thickened knobs, quite entire, or with 1–4 spines on each side, keeled in the middle, keel sometimes spinulose.—*R. Cunninghamii*, Meisn. in *A. DC. Prodr.* 14. 62; *R. Brownianus*, Raoul, Choix; *R. fimbriatus*, A. Cunn. not Br.; *R. cuneifolius*,  $\beta$ , *Fl. Antart.* i. 67.

**Northern** and **Middle** Islands: common, *Banks* and *Solander*, etc. **Lord Auckland's** Island, *J. D. H.*; very nearly allied to the Australian *R. Brownii*, but apparently differing in the prostrate habit. It is perhaps *R. dumosus*, A. Cunn., of New South Wales, which has the same habit.

Besides the above, the common English Docks *R. crispus*, L., and *R. obtusifolius*, L., together with the small *R. acetosa*, have been introduced into New Zealand, and are quasi-indigenous; some of them, indeed, are spreading at an enormous rate.

## ORDER LXIV. LAURINEÆ.

Trees or shrubs, often aromatic; one genus is of climbing leafless herbs. Leaves alternate, rarely opposite, quite entire, exstipulate. Flowers usually hermaphrodite, small, green, fascicled paniced or umbelled.—Perianth of 4–8 (often 6), herbaceous, imbricate segments, rarely 0. Stamens usually 12–15, in 2 or 3 series, all fertile or the inner sterile, filaments naked or glandular at the base; anther-cells 2–4, opening in front or behind by upturned valves. Ovary free, 1-celled; style short, stigma simple or 3-lobed; ovule 1, pendulous, rarely 2. Drupe or berry free or enclosed in the perianth, 1-seeded. Seed with membranous testa, large plano-convex cotyledons, and no albumen.

A very large tropical Order, to which the Bay Laurel, Camphor, and Cinnamon belong.

Leafy shrub or tree. Flowers in a 4- or 5-leaved involucre . . . . . 1. TETRANTHERA.

Leafy trees. Flowers paniced . . . . . 2. NESODAPHNE.

Leafless, twining, string-like herb . . . . . 3. CASSYTHA.

## 1. TETRANTHERA, Jacquin.

Shrubs or trees. Leaves alternate, rarely opposite.—Flowers usually axillary, diœcious, umbelled within a 4- or 5-leaved, deciduous involucre. Perianth 0 or 4–8-parted. *Male fl.*: Stamens 6–15; all or the inner filaments glandular at the base; anthers 4-celled. Ovary rudimentary. *Female fl.*: Stamens rudimentary. Ovary oblong, with a dilated stigma. Berry ovoid.

A very large genus in the tropics of the Old World.

1. **T. calicaris**, Hook. f. *Fl. N. Z.* i. 216. A small, evergreen, glabrous, umbrageous tree. Leaves petioled, 3–4 in. long, ovate or oblong, obtuse, quite entire, sometimes glaucous below. Involucral leaves 4 or 5, concave,  $\frac{1}{6}$ – $\frac{1}{3}$  in. long, 4- or 5-flowered. Pedicels silky, as long as the involucral leaves. Perianth of 5–8 oblong segments. Stamens about 12; filaments slender, all 2-glandular; anthers dilated, 4-valved, bursting inwards. Berry ovoid,  $\frac{3}{4}$  in. long; peduncle thickened at the top.—*Laurus calicaris*, A. Cunn.

**Northern** Island: from the Bay of Islands to the east coast, *Banks and Solander*, etc.

## 2. NESODAPHNE, Hook. f.

Forest trees, with evergreen, alternate leaves and axillary or terminal panicles.—Flowers hermaphrodite, paniced. Perianth 6-partite, deciduous. Stamens 12, in 2 series; 6 outer fertile opposite the perianth lobes, with eglandular filaments and introrse anthers; of the 6 inner, 3 are antheriferous with extrorse anthers, and glands opposite the bases of their filaments; the 3 others have imperfect anthers. Style short, stigma simple. Berry ovoid, top of the fruiting peduncle swollen.

A genus confined to New Zealand, as far as at present known.

Branches stout and petioles and panicles tomentose . . . . . 1. *N. Tarairi*.

Branches slender, and petioles and panicles nearly glabrous . . . . . 2. *N. Tawa*.

1. **N. Tarairi**, Hook. f. *Fl. N. Z.* i. 217. A lofty forest tree, 60–80 ft. high. Branches stout, petioles panicles and costa of leaf below densely

tomentose. Leaves 3-6 in. long, coriaceous, obovate-oblong, obtuse, glabrous above, puberulous and glaucous below. Panicles branched, 1-2 in. diam. Flowers shortly pedicelled,  $\frac{1}{6}$  in. diam. Berry  $1\frac{1}{2}$  in. long, ovoid, purple.—*Laurus Tarairi*, A. Cunn.

Northern parts of the **Northern** Island, *Banks and Solander*, etc. Wood white, splits freely, *A. Cunningham*. Berry much eaten by birds, and, when boiled, by man. Embryo said to be poisonous when raw.

2. **N. Tawa**, *Hook. f. Fl. N. Z. i. 217*. A lofty forest tree, 60-70 ft. high. Branches slender, youngest silky. Leaves variable, 3-4 in. long, lanceolate or narrow elliptic-oblong, acute, finely reticulated on both surfaces, glaucous below. Panicles slender, branches elongate. Flowers small, quite glabrous. Berries small.—*Laurus Tawa*, A. Cunn.; *L. Victoriana*, Colenso.

Northern parts of the **Northern** Island, *Banks and Solander*, etc. Wood poor, very destructible, used for spears. Berries eaten. Leaves very aromatic and pungent.

### 3. CASSYTHA, Linn.

Leafless, twining, herbaceous or half shrubby plants, attached by suckers to shrubs, etc., on which they are parasitical, as with *Cuscuta*. Stems and branches slender, terete, like whips. Flowers spiked capitate or panicle, hermaphrodite.—Perianth 6-partite; tube very short; segments erect, in 2 series. Stamens 12, in 2 series, the 3 interior opposite the inner segments of the perianth with imperfect anthers, the rest fertile, the filaments of some 2-glandular at the base. Anthers 2-celled; of outer row opening inwards, of inner row outwards. Fruit enclosed in the baccate perianth.

A large genus, abounding in Australia, with a few Indian, Pacific, and American species.

1. **C. paniculata**, *Br.*;—*Fl. N. Z. i. 218*. Branches glabrous,  $\frac{1}{12}$ — $\frac{1}{10}$  in. diam., smooth; tips silky; scales at the axils of the branches small, ovate, acuminate, membranous. Spikes 1-2 in. long, simple or branched. Flowers shortly pedicelled, distant, cylindrical,  $\frac{1}{8}$ — $\frac{1}{6}$  in. long, sometimes pubescent, with several orbicular, minute bracts at the base. Ovary glabrous.

Northern part of the **Northern** Island, *Dieffenbach*, *Colenso*. A native of New South Wales.

## ORDER LXV. MONIMIACEÆ.

Trees or shrubs, often aromatic. Leaves opposite, rarely alternate, exstipulate. Flowers racemose or cymose, hermaphrodite or unisexual.—Perianth rotate or subcampanulate, 4-15-lobed. *Male* fl.: Stamens indefinite, all or most fertile; filaments short; anthers 2-celled, opening by slits or by ascending valves. *Female* fl.: Stamens 0 or reduced to scales. Ovaries numerous, 1-celled; style terminal or lateral, stigma simple; ovule 1, erect or pendulous. Fruit of numerous drupes, or of achenes with persistent plumose styles, often included in the urceolate tube of the perianth. Seed pendulous; embryo in the axis of oily and fleshy albumen; cotyledons very short, divaricating.

A small Order, native of the tropics of South America, South India, and its islands, and extratropical America, Tasmania, and Chili.

Anthers with valves. Ovule erect. Achenes with plumose styles . . . 1. *ATHEROSPERMA*.  
 Anthers with slits. Ovule pendulous. Drupes stipitate . . . . . 2. *HEDYCARYA*.

### 1. *ATHEROSPERMA*, Lab.

Trees. Leaves opposite, aromatic. Flowers paniced, diœcious.—Perianth 5–8-fid; lobes in many series. *Male fl.*: Stamens 6–20; filaments 2-glandular at the base; anthers with 2 ascending valves. *Female fl.*: Stamens reduced to scales. Ovaries 5–20, villous. Achenes with long plumose styles, included in the urceolate perianth, which splits laterally.

A small genus, including the following, two Australian, and a Chilian species.

1. *A. novæ-Zelandiæ*, Hook. f.—*Laurelia novæ-Zelandiæ*, A. Cunn.; —Fl. N. Z. i. 218. t. 51. A tree, 150 ft. high, with buttressed trunk, 3–7 ft. diam., the buttresses 15 ft. thick at the base (*Bidwill*); bark white, wood soft, yellowish; branches whorled and petioles pubescent. Leaves petiolate, coriaceous,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, ovate or oblong, obtuse, glabrous, obscurely serrate. Flowers in axillary racemes, silky,  $\frac{1}{4}$  in. diam. Stamens 6–10. Fruiting perianth narrow-urceolate, elongate. Achenes 6–10, with their plumose styles 1 in. long, very narrow.

**Northern** and northern parts of the **Middle** Island, *Banks and Solander*. Wood used for boat-building.

### 2. *HEDYCARYA*, Forst.

Aromatic trees. Leaves evergreen, opposite, toothed or entire. Flowers paniced, diœcious.—Perianth rotate, 5–10-lobed. *Male fl.*: Anthers very numerous, sessile in the base of the perianth, opening by slits. *Female fl.*: Ovaries numerous; stigma sessile, obtuse; ovule pendulous. Drupes few, stipitate, seated on the perianth, which does not enlarge.

A small genus of Australian and New Zealand plants.

1. *H. dentata*, Forst.; —Fl. N. Z. i. 219. A small evergreen bush or tree, 20–30 ft. high; branches pubescent. Leaves 1–4 in. long, obovate or linear-oblong, obtuse or acute, coarsely serrate, rarely entire, glabrous or slightly pubescent. Panicles axillary, pubescent, shorter than the leaves. Perianth pubescent,  $\frac{1}{2}$  in. diam. Anthers hairy at the tip. Drupes oblong, obtuse,  $\frac{1}{2}$  in. long, red; endocarp coriaceous.—Raoul, Choix, t. 30; *H. dentata* and *H. scabra*, A. Cunn.; *Zanthoxylon novæ-Zelandiæ*, A. Rich.

**Northern** and **Middle** Islands: as far south as Akaroa, *Banks and Solander*, etc.

## ORDER LXVI. PROTEACEÆ.

Shrubs or trees, usually rigid and dry. Leaves usually alternate, exstipulate. Inflorescence various. Flowers hermaphrodite.—Perianth of 4 narrow segments, usually connate below, their free portion revolute, valvate in bud. Stamens 4, inserted on the lobes of the perianth or below them; filaments short; anther adnate, linear, bursting by 2 slits. Hypogynous glands usually 4. Ovary free, 1-celled; style usually long, stigma simple; ovules solitary, geminate or numerous. Fruit a nut drupe samara or follicle, 1-celled or



almost 2-celled by a false septum formed by the coats of the ovules, which when 2 are placed back to back. Seed various; albumen 0; embryo straight.

A large Australian and South African Order, rare elsewhere, but found in South India, Japan, the Malayan, some of the Pacific islands, and in South America.

Lofty, slender tree. Leaves serrate. Fruit a dry follicle . . . . . 1. KNIGHTIA.  
Small tree. Leaves narrow, entire. Fruit a drupe . . . . . 2. PERSOONIA.

### 1. KNIGHTIA, Br.

Flowers densely racemed in subsessile cylindrical cones.—Perianth-segments cohering by their margins into a long club-shaped tube, ultimately separating. Stamens inserted towards the ends of the segments; anthers long, linear. Hypogynous glands 4. Ovary sessile, narrowed into a long, very stout style, stigma vertical; ovules 4. Follicle coriaceous, 1-celled. Seeds winged at the tip.

A small genus, containing a New Zealand and New Caledonian species.

1. **K. excelsa**, Br.;—*Fl. N. Z.* i. 219. A lofty, slender tree, 100 ft. high, with the habit of a Lombardy Poplar; branches very stout, woody, and as well as the inflorescence densely covered with rusty, velvety down. Leaves 4–8 in. long, hard, petioled, obovate- or linear-oblong, obtuse, coarsely toothed. Racemes sessile, 2–3 in. long, 2 in. diam. Flowers in densely crowded pairs, shortly pedicelled, 1–1½ in. long before expansion, ½ in. diam. in the middle. Ovary tomentose; stigma clavate. Follicle woody, narrow linear-oblong; terete, downy, pedicelled, contracted into the stout, straight, persistent style.—Br. in Linn. Trans. x. 194. t. 2.

**Northern** Island: common in the forests, *Banks* and *Solander*, etc. Wood mottled red and brown, used for furniture and for shingles.

### 2. PERSOONIA, Smith.

Evergreen shrubs and trees. Leaves alternate, coriaceous, various in shape, etc. Flowers usually in short axillary spikes or racemes.—Perianth-segments cohering by their margins into a club-shaped tube, ultimately separating. Stamens on the middle of the segments. Hypogynous glands 4. Style slender, stigma obtuse; ovules 1 or 2. Drupe with a 1- or 2-celled nut.

A large Australian genus.

1. **P. Toro**, *A. Cunn.*;—*Fl. N. Z.* i. 219. Small evergreen tree; branches woody, glabrous. Leaves 3–8 in. long, coriaceous, very narrow, linear-lanceolate, gradually narrowed into the petiole, acuminate or obtuse and apiculate, quite entire, smooth and polished on both surfaces, lateral veins nearly parallel. Flowers ¼ in. long, very shortly pedicelled, in short, axillary, pubescent, 6–10-flowered racemes 1 in. long. Ovary glabrous, sessile.—*Bot. Mag.* t. 3513.

**Northern** Island: from Auckland northwards, *Banks* and *Solander*, etc.

## ORDER LXVII. THYMELEÆ.

Shrubs with very tough bark, often acid. Leaves opposite or alternate, simple, quite entire. Flowers usually in terminal corymbs, hermaphrodite.

—Perianth inferior, tubular campanulate or urceolate; limb 4-lobed, imbricate; throat naked or with glands. Stamens inserted on the tube of the perianth, usually 2 or 4, rarely more, then in 2 series, the upper opposite its lobes. Ovary 1-celled; style lateral or terminal, stigma capitate; ovule usually solitary, pendulous. Fruit a nut drupe or berry, 1-seeded. Seed pendulous; testa usually thin; albumen 0, scanty or abundant; cotyledons plano-convex.

A large European, Oriental, South African, Australian, and New Zealand Order (to which the *Daphne* and *Mezercon* belong), comparatively rare elsewhere. The bark yields excellent fibre; paper is made of it in India, China, and Japan. The above character does not include the tribe *Aquilarieæ*; Indian trees yielding Aloes- or Eagle-wood, in which the ovary is 2-celled and fruit capsular.

Stamens 2 . . . . .	1. PIMELEA.
Stamens 4 . . . . .	2. DRAPETES.

### 1. PIMELEA, Banks and Solander.

Shrubs, much branched, erect or prostrate. Leaves opposite, coriaceous, often imbricate; florals sometimes larger and whorled, forming an involucre. Flowers capitate, white rosy or yellow.—Perianth tubular, coloured; limb 4-lobed, throat naked. Stamens 2, opposite the outer perianth-lobes; filaments slender. Ovary ovoid; style lateral, slender. Fruit dry or baccate, naked or included within the perianth-tube. Albumen scanty or copious.—*Banksia*, Forst. Char. Gen.; *Passerina*, Forst. Prodr.; *Cookia*, Gmelin.

A very extensive Australian and New Zealand genus, not found elsewhere, extremely variable in foliage. In the New Zealand species the perianth is not jointed in the middle as in many Australian ones, and the nut is often enclosed in the persistent tube of the perianth, which is membranous or fleshy. The species are most variable, and difficult of discrimination. I have forms that appear intermediate between the best-marked species.

#### *Erect shrubs. Branches and leaves perfectly glabrous.*

Leaves 1-2 in., lanceolate. Flowers $\frac{1}{2}$ in. . . . .	1. <i>P. longifolia</i> .
Leaves $\frac{1}{2}$ - $\frac{2}{3}$ in., oblong or lanceolate. Flowers $\frac{1}{4}$ in. . . . .	2. <i>P. gnidia</i> .
Leaves $\frac{1}{2}$ - $\frac{1}{4}$ in., oblong or obovate, obtuse. Florets large . . . . .	3. <i>P. Traversii</i> .

#### *Erect, rarely prostrate shrubs. Branches silky villous or pubescent.*

Leaves $\frac{1}{2}$ -1 in., lanceolate, glabrate pilose or silky . . . . .	4. <i>P. virgata</i> .
Leaves $\frac{1}{4}$ in., coriaceous, keeled, glabrous, floral large . . . . .	5. <i>P. buxifolia</i> .
Leaves $\frac{1}{4}$ - $\frac{1}{2}$ in., with appressed, shining, silky hairs below . . . . .	6. <i>P. arenaria</i> .

#### *Procumbent or prostrate, rarely erect shrubs. Branches pubescent or villous.*

Branches villous with white hairs. Leaves $\frac{1}{6}$ in., very thick, obtuse, glabrous . . . . .	7. <i>P. Urvilleana</i> .
Branches grey. Leaves $\frac{1}{2}$ - $\frac{1}{3}$ in., glabrous, oblong or lanceolate . . . . .	8. <i>P. prostrata</i> .
Branches silky. Leaves $\frac{1}{2}$ - $\frac{1}{3}$ in., silky, oblong or lanceolate . . . . .	9. <i>P. Lyallii</i> .
Branches villous. Leaves $\frac{1}{6}$ - $\frac{1}{4}$ in., silky-villous above and below, linear-oblong, obtuse . . . . .	10. <i>P. sericeo-villosa</i> .

1. *P. longifolia*, Banks and Sol.;—*Fl. N. Z.* i. 220. A small, erect shrub, 2-6 ft. high, perfectly glabrous, the inflorescence excepted. Leaves crowded, not imbricate, very shortly petioled, spreading, 1-2 in. long,  $\frac{1}{4}$ - $\frac{1}{2}$  broad, oblong- or linear-lanceolate, acuminate, flat, often glaucous below; veins distinct; floral similar or rather broader. Flowers numerous, silky,  $\frac{1}{2}$

in. long, white, odorous. Stamens and style exserted. Nut crustaceous, enclosed in the base of the perianth.

**Northern** Island: common, *Banks and Solander*, etc.; and northern parts of the **Middle** Island: Nelson mountains, ascending to 2000 ft., *Travers*.

2. **P. Gnidia**, *Forst.*;—*Fl. N. Z.* i. 221. A short, erect, robust, glabrous (or nearly so) species, 1–5 ft. high; branches very stout; bark pale or dark, always glabrous. Leaves crowded, very coriaceous, shining above, petioled,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, oblong or oblong-lanceolate, acute or obtuse, almost or quite keeled, veinless; floral not very different. Flowers  $\frac{1}{4}$  in. long, silky and villous.—*Passerina Gnidia*, *Forst.*; *Cookia Gnidia*, *Gmel.*

**Northern** Island: thickets near the top of the Ruahine range, *Colenso*. **Middle** Island: Dusky Bay, *Forster*, *Menzies*; South Island, *Lyall* (leaves longer, nearly flat). The var. *β. Menziesii*, of *Fl. N. Z.*, is, I now believe, the true *P. Gnidia*, *Forst.*, distinguished from *P. buxifolia*, which is confounded with it in that Flora, by the perfectly glabrous branches, and floral leaves not much differing from the cauline.

3. **P. Traversii**, *Hook. f., n. sp.* A short, very robust, glabrous, alpine, usually erect species, 4–24 in. high, densely branched; branches very stout, often tortuous, always glabrous, tubercled with close-set scars at the insertion of fallen leaves. Leaves densely 4-fariously imbricate, very coriaceous, sessile,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, obovate oblong or almost orbicular, quite glabrous, obtuse, nerveless, midrib often obscure, yellowish when dry; floral large (sometimes 4 times as large), broader, often edged with purple, often verdigris-green when dry. Flowers very silky,  $\frac{1}{4}$  in. long, white.

**Middle** Island: Macrae's Run, *Munro*; Huramui and Wai-au-an mountains, *Travers*; Southern Alps, in various places, alt. 2–4000 ft., *Sinclair and Haast*; Otago, Waitaki valley, *Hector and Buchanan*. One of the most distinct species, though sometimes prostrate, and sometimes having a few hairs on the branches, when it approaches forms of *P. prostrata*.

4. **P. virgata**, *Vahl*;—*Fl. N. Z.* i. 220. A small, erect, dense shrub, 1–2 ft. high. Branches slender, strict, silky. Leaves spreading, not imbricate,  $\frac{1}{2}$ –1 in. long, linear- or oblong-lanceolate, obtuse acute or acuminate, glabrous or pilose or glabrous above and silky below; floral similar. Flowers small, about 8–10 in a head,  $\frac{1}{4}$  in. long, silky; tube swelling below; lobes broad, obtuse. Nut obovate, enclosed in the dry or baccate base of the perianth, brittle.—*P. pilosa*, *Vahl*; *Passerina pilosa*, *Forst. Prodr.*; *P. axillaris*, *Thunb.*; *Banksia tomentosa*, *Forst. Gen.*

Abundant throughout the islands, *Banks and Solander*, etc. I think this passes into *P. prostrata*.

5. **P. buxifolia**, *Hook. f., n. sp.* A small, stout, erect, rigid shrub, 1–5 ft. high, much branched; branches very stout, hirsute with short grey hairs; bark black, minutely verrucose. Leaves close-set, 4-fariously imbricate, very coriaceous,  $\frac{1}{4}$  in. long, oblong-ovate, keeled, acute or obtuse, lateral nerves conspicuous when dry; floral half as large again and broader than the cauline, often green when dry. Flowers  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, densely silky.

**Northern** Island, *Dieffenbach*; base of Tongariro and top of Ruahine range, *Colenso*. Very similar in habit to *Veronica buxifolia*. Closely allied to *P. Gnidia*, but the hairy branches and larger floral leaves at once distinguish it. The evident lateral nerves on the leaf are a good character. I have a small specimen from *Colenso* (stony banks, Ahuriri), which has the foliage of this, but habit of *P. prostrata*.

6. **P. arenaria**, *A. Cunn.*;—*Fl. N. Z.* i. 221. A very beautiful, erect, rarely prostrate, small shrub, 8–24 in. high, much branched, villous with white, shining, silky hairs; branches stout, much scarred, most densely villous. Leaves close-set, but not imbricating, spreading or reflexed, flat,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, broadly oblong or orbicular, obtuse, pilose above, very silky and shining below; floral rather larger and broader. Flowers  $\frac{1}{4}$  in. long, villous or shaggy. Fruiting-perianth baccate.—*Bot. Mag. t.* 3270; *Passerina villosa*, Thunb.; *Gymnococca arenaria*, Fisch. and Mey.

**Northern** Island: especially on sand dunes, near the sea, *Banks and Solander*, etc. **Chatham** Island, *Dieffenbach*. Fruit eaten; bark used for cloth string, etc. Procumbent specimens are best distinguished from *P. Urvilleana* by the large flowers and silky leaves. Very closely allied to the Tasmanian *P. sericea*, and altogether similar to it, except that the perianth is not transversely articulate.

7. **P. Urvilleana**, *A. Rich.*;—*Fl. N. Z.* i. 221. A small, widely spreading, procumbent species; branches 2–12 in. long, horizontally extending, white with short silky wool. Leaves close-set, often imbricate, very thick and coriaceous,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, sessile, broadly oblong or obovate-oblong, obtuse, concave, nerveless, glabrous or sparingly hairy; floral rather larger and broader. Flowers very small, villous,  $\frac{1}{6}$  in. long; lobes as long as the tube.—*P. prostrata*,  $\beta$ , Meisner in *A. DC. Prodr.* xiv. 517; *Gymnococca microcarpa*, Fisch. and Mey. (?), according to Meisner.

**Northern** Island: rocky places near the sea and inland, *Banks and Solander*, etc.; Bay of Islands, *A. Cunningham*; Mount Egmont, *Dieffenbach*. The bark of this was chewed and beaten out to make the cloth of which the top-knots of the chiefs were formed, etc. Meisner unites this with *P. prostrata*, not without some reason; but by the same rule most of the other New Zealand species must be united too, for there appear to be forms uniting many of them; this keeps its characters well, both on the coast and inland, and these are as marked as between any two consecutive species.

8. **P. prostrata**, *Vahl*;—*Fl. N. Z.* i. 220. A small, prostrate, spreading, extremely variable species; branches slender, 2–10 in. long, more or less hairy, but seldom white with villous hairs, as in *P. Urvilleana*. Leaves crowded and imbricated, erect patent or recurved, or sparse, sessile, not thickly coriaceous,  $\frac{1}{12}$ – $\frac{1}{3}$  in. long, rarely more, oblong-obovate or lanceolate, obtuse or acute, usually nerveless or with a stout midrib below, glabrous; margins often incurved when dry; floral usually a little larger and broader. Flowers  $\frac{1}{8}$ – $\frac{1}{6}$  in. long, villous silky or pilose; lobes of perianth shorter than the tube. Fruit often baccate.—*P. laevigata*, Gærtn.

Var.  $\alpha$ . Stems stout, suberect, or branches ascending. Leaves oblong or lanceolate. Flowers very silky.

Var.  $\beta$ . Stems very diffusely branched, more slender; branches spreading. Leaves oblong or broadly obovate. Flowers very small, silky or nearly glabrous.

Var.  $\gamma$ . Stems suberect, black, tortuous, and scarred. Leaves erecto-patent, ovate or linear-lanceolate, acute, glabrous.

Throughout the **Northern** and **Middle** Islands: var.  $\alpha$ , abundant, ascending to 4000 ft., *Banks and Solander*, etc.; var.  $\beta$  also abundant, especially in hilly districts; var.  $\gamma$ , alpine regions of the **Middle** Island, from Nelson (*Travers*) to Otago, *Hector*. A most abundant and most variable plant; alpine states, with slender, nearly glabrous branches, and short, obtuse, rounded leaves, look different, but pass insensibly into the ordinary states. The prostrate habit, glabrous, small foliage and small flowers, distinguish this from *P. virgata*; the grey (not snow-white) villous hairs of the branches, and less coriaceous leaves, from *P. Urvil-*



*leana*; the glabrous leaves and smaller flowers, from *P. Lyallii*; the var.  $\gamma$  looks different, but is certainly only an alpine form.

9. ***P. Lyallii*, Hook. f. Fl. N. Z. i. 222.** A small, prostrate or suberect, very pilose, rarely glabrescent species; branches short and suberect, or long and trailing, 2–20 in. long, covered with grey or silky pubescence, rarely glabrous, bark brown. Leaves usually close-set and imbricating, erect or patent,  $\frac{1}{6}$ – $\frac{1}{3}$  in. long, oblong or lanceolate, acute or acuminate, silky with long hairs chiefly on the lower surface, concave, nerveless; floral the same as the cauline. Flowers  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, silky. Ovary pilose.

**Northern Island:** between the Ruahine range and Taupo, *Colenso*. **Middle Island:** Ruapuke Island and Port William, *Lyall*; Southern Alps, alt. 1500–2500 ft., *Sinclair and Haast*; Gordon's Nob, *Munro*; Wairau mountains, alt. 3–5500 ft., *Travers*; Otago, Waitaki valley, abundant, *Hector and Buchanan*. This resembles small specimens of *P. virgata*, but is of a totally different habit. From *P. prostrata* the silky leaves distinguish it. Travers and Buchanan send excellent series of forms, amongst which some have all but glabrous leaves, and hence run into *prostrata*. Haast sends from shingle flats on the Macaulay and Godley rivers, alt. 3000 ft., a stout, erect, small plant, with much the habit of states of *P. Lyallii*, but the leaves are more coriaceous and glabrous.

10. ***P. sericeo-villosa*, Hook. f., n. sp.** A small, prostrate, much branched, densely tufted species, densely villous with whitish shining silky hairs; branchlets very short, leafy. Leaves close-set,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, linear-oblong, obtuse, concave, equally villous above and below. Flowers few, densely silky,  $\frac{1}{6}$  in. long. Ovary villous with long hairs.

**Middle Island:** Macrae's Run, *Munro*; Wairau mountains, *Travers*; Otago, Waitaki river, *Hector and Buchanan*. This, from all the above habitats, keeps its characters so perfectly, that it is difficult to suppose it to be a form of *P. Lyallii*, from which it differs in the more depressed habit, much shorter branchlets, and far more copious, silky clothing.

## 2. DRAPETES, Lamarck.

Small, tufted, moss-like herbs or suffruticose plants. Leaves small, linear, crowded. Flowers solitary or few together, inconspicuous, terminal.—Perianth tubular or funnel-shaped; limb 4-fid; throat sometimes furnished with 4 small glands or scales opposite the lobes. Stamens 4, alternate with the lobes; filaments subulate. Style terminal or lateral, filiform; stigma capitate. Nut small. Albumen copious.

A small southern alpine and Antarctic genus, containing a New Zealand, a Tasmanian, a Fregian, and a Bornean species; it has been split into three genera by Endlicher and Meisner, according as the tube of the perianth is continuous or transversely articulate, and its throat naked or provided with glands.

Leaves linear or linear-oblong. Perianth funnel-shaped . . . . . 1. *D. Dieffenbachii*.  
Leaves ovate-oblong. Perianth campanulate . . . . . 2. *D. Lyallii*.

1. ***D. Dieffenbachii*, Hook. Lond. Journ. Bot. ii. 497. t. 17;—Fl. N. Z. i. 222.** A small, densely tufted, moss-like plant; branches slender, 6–12 in. long. Leaves imbricated,  $\frac{1}{6}$  in. long, linear, obtuse, bearded at the tip, keeled at the back. Flowers terminal, solitary or fascicled, as long as the leaves, very shortly pedicelled. Perianth not articulate; throat with 4 glands.

**Northern Island:** Mount Egmont, *Dieffenbach*; Tongariro, *Bidwill*; Ruahine range

*Colenso*. **Middle** Island: abundant on the alps, ascending to 5000 ft., from Nelson, *Bidwill*, etc., to Otago, *Hector and Buchanan*. This is, I think, the same with the Tasmanian *D. tasmanica* of my 'Flora Tasmaniae,' which has also been found on the Australian alps by Mueller.

2. **D. Lyallii**, *Hook. f. Fl. N. Z.* ii. 336.—*D. muscosa*, *Fl. N. Z.* i. 223, not Lamarck. Stems short, densely tufted, rarely with long straggling branches. Leaves ovate-oblong, obtuse, ciliated at the tip. Perianth almost campanulate.

**Middle** Island: Nelson, Wai-au-ua valley, *Travers*; Southern Alps, *Sinclair and Haast*; Otago, lake district, alpine, *Hector and Buchanan*; Southern Island, *Lyall*. A very distinct plant from *D. Dieffenbachii*, to which it has been reduced by Meisner, of different habit, with shorter, broader, closer-set leaves, and shorter, broader perianth.

## ORDER LXVIII. SANTALACEÆ.

Trees shrubs or herbs. Leaves usually alternate, quite entire, exstipulate. Flowers usually small, very inconspicuous, in heads cymes or spikes, hermaphrodite or unisexual.—Perianth wholly or partially superior; lobes 3–6, persistent or deciduous, valvate. Stamens as many as and inserted on the perianth-lobes; filaments usually very short; anthers 2-celled. Ovary inferior or superior, 1-celled; style usually short, simple or 3-fid; ovules 3–5, pendulous from an erect central placenta. Fruit a 1-seeded nut or berry, indehiscent. Albumen fleshy; embryo usually terete and small; radicle superior.

A widely-diffused Order in various parts of the globe, temperate and tropical.

Trees or shrubs, leafless. Flowers in minute spikes . . . . . 1. EXOCARPUS.  
Trees. Leaves long. Flowers in axillary cymes . . . . . 2. SANTALUM.

### 1. EXOCARPUS, Labillardière.

Shrubs or trees, with naked, twiggy, leafless branches, bearing scales at the ramifications, rarely leafy. Flowers minute, green, in axillary spikelets or clusters, hermaphrodite or unisexual.—Perianth of 4–6 spreading, deciduous lobes. Stamens 4–6, short, inserted on the base of the lobes; filaments glabrous. Disk 5-lobed. Ovary superior, fleshy; style very short, conic; stigma subcapitate; ovules not ascertained. Nut oblong, seated on the swollen drupe-like tip of the peduncle or base of the perianth. Embryo minute, cylindric; cotyledons small.

An Australian, New Zealand, and Pacific Island genus.

1. **E. Bidwillii**, *Hook. f. Fl. N. Z.* i. 223. *t.* 52. A small, rigid, procumbent shrub, 8–16 in. high, much branched; branches stiff, short, grooved, terete, leafless, with minute triangular scales at the bases of the branches. Flowers 8–10, in short puberulous axillary spikes. Perianth 5- or 6-parted. Stamens 5 or 6. Nut black, drupaceous; peduncle red.

**Middle** Island: Warran mountains, *Bidwill*; river beds of the Kowai and Waitaki rivers, alt. 2000–3500 ft., *Haast*; Hurumui mountains, *Travers*. Closely allied to the *E. humifusa* of Tasmania, and probably a variety of that plant, but the flowers are more spiked and 5- or 6-merous. I think two plants are confounded in the 'Tasmanian Flora' under *E. humifusus*, one the true plant of Brown, resembling this, the other much smaller, with compressed stems, which I originally called *E. nanus*.

## 2. SANTALUM, Linn.

Shrubs or trees. Leaves opposite or alternate. Flowers green, in axillary cymes, hermaphrodite.—Perianth-tube campanulate, with 4 or 5 spreading, ovate-triangular, deciduous leaflets, having a tuft of hairs at the inner base of each. Stamens 4 or 5; filaments short; anthers ovoid. Disk concave, 4- or 5-lobed. Ovary superior in the bud, afterwards inferior; style conic or cylindric, stigmas 2–4; ovules 2–4. Drupe inferior, globose or turbinate, crowned with the remains of the perianth, 1-seeded. Seed inverse; albumen fleshy; embryo cylindric; cotyledons very short.

A genus of few species, scattered through the tropics of Asia, Australia, and the Pacific islands. Several species produce Sandal-wood.

1. **S. Cunninghamii**, Hook. f. *Fl. N. Z.* i. 223. A small tree. Leaves excessively variable, alternate, opposite in young plants, shortly petioled, 2–4 in. long, from narrow linear-lanceolate to broad obovate, veined, minutely dotted. Flowers green, in short axillary cymes. Perianth  $\frac{1}{5}$ – $\frac{1}{4}$  in. long; tube hemispherical; lobes 4 or 5, deciduous. Drupe nearly  $\frac{1}{2}$  in. long.—*S. Mida*, Hook. Ic. Pl. t. 563 and 575; *Mida salicifolia*, *eucalyptoides*, and *myrtifolia*, A. Cunn.

**Northern Island**: from the east coast, northwards, *A. Cunningham*, etc.

## ORDER LXIX. EUPHORBIACEÆ.

Herbs trees or shrubs, usually abounding in milky juice. Leaves various, alternate or opposite, often stipulate. Inflorescence very various. Flowers always unisexual (incomplete males are crowded round a female in *Euphorbia*, within an involucre, which hence resembles a perianth).—Stamens few or many; anthers usually didymous. Perianth 0, or very various from a scale to an almost perfect perianth in 2 rows. Ovary usually 2- or 3-lobed, 2- or 3-celled; style 2- or 3-lobed; segments stigmatic along the inner face; ovules 1 or 2, pendulous in each cell. Fruit very various, a 2- or 3-valved capsule in the New Zealand genera, consisting of 3 carpels, finally separating and dehiscing dorsally. Seeds pendulous, albuminous; embryo with flat cotyledons and small radicle.

One of the largest and most important Orders of plants, containing a vast number of different forms, with flowers of very different structure, found in all parts of the world, but rare in cold countries. The Croton-oil, Castor-oil (almost naturalized in the Northern Island), and a vast number of other medicinal and economic plants belong to it.

Herbs. Flowers collected in a perianth-like involucre, ♂ of naked sta-

mens, ♀ of a simple, naked pistil . . . . . 1. EUPHORBIA.

Shrubs or trees. Flowers in long, slender spikes . . . . . 2. CARUMBUM.

## 1. EUPHORBIA, Linn.

Herbs, with abundant milky juice, rarely shrubs or subarborescent. Leaves opposite or alternate, quite entire or toothed. Flowers usually in terminal cymes.—Involucre (resembling a perianth) ureolate or cup-shaped, containing many stamens of unequal length, the filaments jointed in the middle,

and 1 central stalked pistil. Each stamen is regarded as a pedicelled male flower, without perianth. The pistil represents a pedicelled female flower, also without a perianth. Ovary 3-celled; style 3-fid; ovules 1 in each cell. Capsule 3-lobed, separating from a central axis into 3 cocci. Testa crustaceous, polished, grey.

An enormous genus, found in all temperate and tropical parts of the world.

1. **E. glauca**, *Forst.*;—*Fl. N. Z.* i. 227. Perfectly glabrous, glaucous; stems herbaceous, 1–2 ft. high, rising from a woody rhizome, sometimes as thick as the finger, erect, umbellately branched at the top, very leafy. Leaves spreading, 1–4 in. long, from oblong-obovate to narrow- or lanceolate-obovate, obtuse or mucronate; floral leaves whorled below the divisions of the umbel, broadly oblong. Involucres hid amongst the foliage, shortly pedicelled, campanulate,  $\frac{1}{4}$  in. diam., fleshy, with 4 or 5 flat purple lunate glands at the mouth. Capsule subglobose, quite smooth, about as large as a pea.

Throughout the islands, common on the beach, *Banks and Solander*, etc.

*E. helioscopia*, Linn., a common annual English weed, smaller than *E. glauca*, with shorter, toothed leaves, is introduced into some parts of New Zealand.

## 2. CARUMBIUM, Reinwardt.

Shrubs or small trees. Leaves stipulate, alternate, quite entire, glabrous; petioles long, 2-glandular at the tip. Flowers bracteate, in terminal spikes, monœcious.—*Male*: crowded. Perianth of 1 orbicular or 2 semi-orbicular leaflets, often connate, with a large gland on either side of the base of each. Stamens 6 or many; filaments short, more or less connate; anthers didymous, bursting laterally. *Female*: solitary. Perianth as in the male. Ovary sessile, 2- or 3-celled; style stout, 2- or 3-partite, stigmas 2 or 3 linear or oblong. Capsule 2- or 3-celled, 2- or 3-valved, 2- or 3-seeded.—*Omalanthus*, A. Juss.

A small genus, natives of tropical Australia and the Pacific islands.

1. **C. polyandrum**, *Hook. f., n. sp.*—*Omalanthus nutans*, Hook. f. in Journ. Linn. Soc. i. 127, not Guillemín. A small tree; branches terete, brittle, glaucous. Leaves 2–3 in. long, with petioles 2–4 in. long, triangular-ovate or nearly orbicular, acute, quite entire, membranous, somewhat undulate, glaucous below; stipules  $\frac{1}{2}$  in. long, membranous. Raceme terminal, slender, nodding, 4–6 in. long. *Male* fl.: very numerous, rather distant, shortly pedicelled,  $\frac{1}{10}$  in. long; bracts minute; perianth of 1 small orbicular scale; anthers very numerous, in a globose stipitate head;—*fem.* fl.: at the base of the raceme, shortly pedicelled; perianth of 2 leaflets; styles very short, 3-fid; stigmas linear, tortuous, minutely 2-fid at the tip and base.

**Kermadec Islands**, *McGillivray*. A very distinct species, not hitherto found elsewhere.

## ORDER LXX. CUPULIFERÆ.

Shrubs or trees. Leaves alternate, with or without stipules. Flowers small, in catkins or fascicled or solitary, unisexual.—*Male*: Stamens 1 or more, surrounded by scales or in a 4–6-leaved or lobed perianth; filaments usually slender; anthers 2-celled. *Female*: solitary or 2–4 together, usually



surrounded by scales, which often form a simple or lobed or parted perianth-like involucre. Perianth adnate with the ovary. Ovary 2–6-celled; styles 2–6, short, usually stigmatiferous on the inner surface; ovules usually 2; pendulous in each cell. Fruit usually of 1 or more 1-seeded nuts, seated in a cup or capsular involucre. Albumen 0; embryo various.

A very large Order, found in most countries, embracing the Oak, Beech, Chestnut, etc., unknown in tropical and South Africa, and in tropical America.

### 1. FAGUS, Linn.

Shrubs or trees; buds scaly. Leaves alternate, coriaceous, evergreen or deciduous, sometimes plaited, often unequal-sided; stipules deciduous, membranous. Flowers monœcious.—*Male*: Perianth campanulate, 5- or 6-fid. Stamens 8–12, inserted round a central disk; anthers 2-celled, apiculate. *Female*: 2 or 4, minute, sessile in a 4-lobed involucre, which is covered with adnate bracts. Perianth urceolate; tube adnate with the ovary; mouth lacinate. Ovary inferior, 3-celled; styles 3, filiform; ovules 1 in each cell, pendulous. Fruit 2–4 3-cornered nuts, enclosed in a 4-valved capsule-like woody lamellated involucre, each 1-seeded. Seed pendulous; testa thin; cotyledons thick, plaited, coherent.

A small genus, of 2 or 3 European and North American species, and several Antarctic-American, Chilian, New Zealand, and Tasmanian ones. Though true Beeches, these are usually called Birches in the southern hemisphere, because of their small foliage.

Leaves glabrous, doubly creuate, veinless . . . . .	1. <i>F. Menziesii</i> .
Leaves glabrous or pilose, deeply serrate, veined . . . . .	2. <i>F. fusca</i> .
Leaves white and downy below, oblong, entire . . . . .	3. <i>F. Solandri</i> .
Leaves white and downy below, ovate rounded or cordate at the base, entire . . . . .	4. <i>F. cliffortioides</i> .

1. ***F. Menziesii*, Hook. f. Fl. N. Z. i. 229.** A handsome tree, 80–100 ft. high; trunk 2–3 diam.; bark silvery, outer layers deciduous; branches tabular; twigs with fulvous pubescence. Leaves deep green, rigid, glabrous,  $\frac{1}{3}$  in. long, rhomboid ovate or orbicular, obtuse, deeply doubly crenate; stipules linear oblong. Fruiting involucre puberulous,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long; segments erect, with 5–7 tiers of soft spines having thickened glandular tips. Nuts downy, 2- or 3-winged; wings produced upwards into sharp points.—Hook. Ic. Pl. t. 652.

**Northern** Island: Ruahine range and Waikare Lake, *Bidwill*, *Colenso*. **Middle** Island: abundant from Nelson, alt. 3000 feet, *Bidwill*, to Dusky Bay, *Menzies*. This is the representative of the Tasmanian *F. Cunninghamii* and Fuegian *F. betuloides*. The “Birch” of Otago, and “Red Birch” of other colonies. The only species between Lake Wainaka and the west coast, *Haast*.

2. ***F. fusca*, Hook. f. Fl. N. Z. i. 229.** A handsome tree, 80–100 ft. high, sometimes 12 ft. diam.; branches pubescent. Leaves petioled, evergreen, young pilose above and glandular below, not very coriaceous, 1–1 $\frac{1}{4}$  in. long, oblong-ovate, deeply serrate; stipules linear-oblong, very deciduous. *Male* fl.: 1–3 at the end of a viscid, short peduncle; perianth 5-toothed. Fruiting involucre broadly ovate; segments with entire or cut membranous scales at the back. Nuts winged; wings toothed at the tip.—Hook. Ic. Pl. t. 631.

Var.  $\beta$ . Leaves more coriaceous, teeth smaller and obtuser, *Hook. Ic. Pl. t. 630*.

**Northern** Island: common on the mountains, *Banks* and *Solander*, etc. **Middle**

Island: abundant, ascending to 3500 ft., *Bidwill*, etc. "Black Birch" of the colonists. I have a small specimen from Travers, without flower or fruit, in which the leaves are quite entire.

3. **F. Solandri**, *Hook. f. Fl. N. Z.* i. 230. A lofty, beautiful, evergreen tree, 100 ft. high; trunk 4 or 5 ft. diam.; bark when young white, smooth, old black, cracked; wood white, close, tough; twigs densely pubescent. Leaves shortly petioled, small,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, linear- or ovate-oblong, obtuse, quite entire, oblique and cuneate at the base, finely reticulated above, white and downy below; stipules very deciduous. *Male* fl. on short 1 flowered peduncles; perianth broad, shallow. Fruiting involucre glabrous or tomentose,  $\frac{1}{4}$  in. long; segments with unequally toothed or entire scales.—*Hook. Ic. Pl.* t. 639.

**Northern** Island: abundant in mountain forests, *Banks and Solander*. **Middle** Island: ascending to alt. 3000–6000 ft., *Bidwill*, etc. "White Birch." I have what appears to be a form of this, with the leaves glabrous below, *Colenso* (Ruahine range) and *Sinclair*.

4. **F. cliffortioides**, *Hook. f. Fl. N. Z.* i. 230. Very similar indeed to *F. Solandri*, but a much smaller plant, with leaves ovate or oblong-ovate, rounded or cordate at the base.—*Hook. Ic. Pl.* t. 673.

**Northern** Island: top of the Ruahine range, *Colenso*. **Middle** Island: abundant on the alps of Nelson and Canterbury, alt. 5–7000 ft., *Bidwill*, *Travers*, *Haast*, etc.; *Otago*, *Hector and Buchanan*, to Dusky Bay, *Menzies*. "White Birch." At first sight this looks like a variety of *F. Solandri*, but wherever found it retains its character, of the leaves round or cordate at the base, and I know of no intermediate forms.

## ORDER LXXI. URTICEÆ.

Trees shrubs or herbs, juice often milky. Leaves and inflorescence various; stipules membranous. Flowers small, inconspicuous, usually cymose or fascicled, unisexual.—Perianth 1–5-lobed or -partite. Stamens usually as many as and opposite to the segments of the perianth; filaments often recurved, elastic; anthers 2-celled. Ovary free, 1-celled; style short or 0, stigma elongate or penicillate. Ovules 1 or 2. Fruit a small nut drupe or samara, 1-seeded. Seed with fleshy albumen or 0; radicle superior.

A very extensive and widely-diffused Order, including the Nettle, Fig, Hemp, Mulberry, and Breadfruit tree. Bark often very stringy, used as cordage, etc.

Tree. Juice milky. Male flowers spiked. Ovule pedulous . . . 1. EPICARPURUS.  
Shrubs or herbs. Juice watery. Flowers solitary or racemed or spiked.

Ovule erect.

Perianth of male 4- or 5-parted. Stamens 4 or 5. Flowers spiked or racemed . . . 2. URTICA.

Perianth cup-shaped. Stamen 1. Flowers solitary or few . . . 3. AUSTRALINA.

Perianth of male 4- or 5-parted, of female tubular, 4-fid . . . 4. PARIETARIA.

Herbs. Flowers small, in a fleshy discoid receptacle. Ovule erect . . . 5. ELATOSTEMMA.

### 1. EPICARPURUS, Blume.

Trees or bushes. Leaves evergreen, harsh and rigid, alternate. Spikes axillary. Flowers diœcious.—*Male*: spiked or in catkins. Perianth of 4 spreading leaflets. Stamens 4, longer than the leaflets. *Female*: spiked.

Perianth of 4 leaflets. Ovary ovoid; styles 2, with subulate stigmas; ovule suspended. Fruit a drupe or nut, 1-seeded. Seed pendulous; albumen 0; cotyledons conduplicate; radicle curved upwards.

A small, tropical Asiatic genus.

1. **E. microphyllus**, *Raoul, Choix*, 14. t. 9;—*Trophis* (?) *opaca*, Banks and Sol.;—*Fl. N. Z. i.* 224. A large tree, 50–60 ft. high, variable in habit and foliage, abounding in milky sap; branches brittle, pubescent at the tips; bark brown. Leaves petioled,  $\frac{1}{2}$ –2 in. long, ovate-oblong, serrate, obtuse or acute, with reticulate veins on both surfaces. *Male* fl.: minute, in catkins  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, which are solitary or paniced;—*fem.* fl. in much shorter-fewer-flowered spikes. Drupe small, red.

**Northern** and **Middle** Islands: as far south as Akaroa, *Banks and Solander*. “Milk-tree” of the colonists; the male spikes often become diseased, and present paniced branches covered with minute bracts.

## 2. URTICA, Linn.

Herbs or small shrubs, with stinging hairs, rarely glabrous. Leaves opposite. Flowers unisexual, glomerate, on simple or branched spikes.—*Male*: Perianth 4-partite. Stamens 4. Ovary imperfect. *Female*: Perianth unequally 4-partite. Ovary ovoid; stigma sessile; ovule erect. Fruit a small, dry nut. Seed compressed; albumen scanty; cotyledons plano-convex.

A considerable genus of tropical and temperate plants, including the common “Stinging Nettle,” now probably naturalized in New Zealand.

Herbaceous. Stinging hairs copious. Leaves variable . . . . .	1. <i>U. incisa</i> .
Herbaceous, stout. Stinging hairs few. Leaves very broadly cordate	2. <i>U. australis</i> .
Shrubby. Stinging hairs most copious, $\frac{1}{4}$ in. long. Teeth of leaves bristle-pointed . . . . .	3. <i>U. ferox</i> .
Herbaceous. Stinging hairs few. Leaves very pubescent . . . . .	4. <i>U. aucklandica</i> .

1. **U. incisa**, *Poiret*;—*U. lucifuga*, Hook. f. *Fl. N. Z. i.* 225. A slender herb, sparingly covered with stinging hairs, 1–2 ft. high. Leaves with long petioles, extremely variable in form, length, and breadth,  $\frac{1}{2}$ –2 in. long, from narrow-lanceolate or linear to broadly ovate-cordate, acute, acutely deeply toothed; petiole very slender; stipules oblong or lanceolate, acute.

**Northern** and **Middle** Islands: common, *Banks and Solander*, etc. Also common in Southern Australia and Tasmania. The female perianth is sometimes tubular and 4-toothed.

2. **U. australis**, *Hook. f. Fl. N. Z. i.* 225. A stout, succulent herb, 1–2 ft. high, glabrous, except for a few scattered, weak, stinging hairs. Leaves large, upper sometimes ternate, 3–4 in. long, very broadly ovate- or almost orbicular-cordate, acute, deeply toothed or crenate; petioles 1–3 in. long; stipules large, 2-fid. Flowers racemose, monœcious?

**Northern** Island: southern extreme, *Bidwill*. **Lord Auckland's** Islands: in woods, *J. D. H.*

3. **U. ferox**, *Forst.*;—*Fl. N. Z. i.* 224. A tall, slender shrub, copiously covered with rigid stinging hairs  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, stem woody; branchlets, petioles, and leaves below, puberulous. Leaves 2–5 in. long, narrow ovate-cordate or linear- or lanceolate-oblong, always broader at the cordate some-

times lobed auricled or hastate base, acuminate, very coarsely toothed, teeth ending in a rigid bristle; petioles  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, bristling with rigid stinging hairs; stipules linear-oblong, entire, obtuse. Flowers racemed.

**Northern and Middle Islands:** not uncommon in woods from the east coast to Otago, *Banks and Solander*, etc. The pain of the sting sometimes lasts four days, *Colenso*.

4. ***U. aucklandica***, *Hook. f. Fl. Antarct.* i. 68. Herbaceous, robust, softly downy all over, except the upper surface of the leaves, where there are a very few stinging hairs. Leaves broadly ovate-cordate, coarsely serrate or toothed, rather coriaceous or rigid; petioles stout,  $\frac{1}{2}$ –1 in. long; stipules foliaceous, 2-fid or 2-partite. Flowers imperfect.

**Lord Auckland's group:** sandy shore and edges of the woods, *J. D. H.* My specimens are too young for a good description.

### 3. **PARIETARIA**, Gaudichaud.

Herbs, rarely shrubs, usually very flaccid and slender, often pubescent. Leaves quite entire, almost exstipulate.—Flowers polygamous, cymose, 1–3-bracteate.—*Male* and *hermaph.*: Perianth 4-partite, pubescent. Stamens 4. *Female*: Perianth tubular, 4-fid. Ovary ovoid or oblong; stigma capitate or spatulate, recurved. Ovule erect. Nut minute, included in the perianth. Seed exalbuminous; cotyledons plano-convex.

A small genus, abundant in waste places in almost all parts of the world.

1. ***P. debilis***, *Forst.*;—*Fl. N. Z.* i. 226. A slender annual; stems 6–24 in. long, erect or decumbent, simple or branched. Leaves extremely variable in size,  $\frac{1}{4}$ –2 in. long, broadly ovate, acute, membranous, quite entire; petioles slender. Cymes dense or lax-flowered; bracts generally linear, not enlarging after flowering. Female flowers most numerous.

Common throughout the islands, *Banks and Solander*, etc. An abundant plant in Australia and in many tropical and temperate climates.

### 4. **AUSTRALINA**, Gaudichaud.

Small, tufted, slender, creeping herbs. Leaves opposite or alternate, crenate, 3-nerved, stipulate. Flowers minute, monœcious, in small, few-flowered, axillary clusters.—*Male*: pedicelled. Perianth boat- or funnel-shaped; limb unequally 2-lipped. Stamen 1. Ovary 0. *Female*: sessile. Perianth ventricose; limb somewhat 5-toothed. Stamen 0. Ovary ovate-lanceolate, narrowed into a straight style; stigma lateral, villous; ovule erect. Nut minute, ovate, included in the perianth. Seed exalbuminous; cotyledons plano-convex.

A small genus found in extratropical Australia, Abyssinia, and New Zealand.

1. ***A. pusilla***, *Gaud.*;—*A. novæ-Zelandiæ*, *Hook. f. Fl. N. Z.* i. 226. Stems slender, intricate, rooting, rather pubescent, 4–8 in. long. Leaves alternate,  $\frac{1}{2}$  in. long, membranous, orbicular or broadly ovate, coarsely crenate; petiole as long as the blade; stipules subulate. *Male* fl.: in pairs from the upper axils, on a peduncle as long as the petioles;—*fem.* fl.: solitary or few together. Perianth compressed, flagon-shaped; style exserted.

**Northern Island:** damp woods or roots of trees, etc., Bay of Islands, Manawata river, etc., *Colenso*, etc. Also a native of Tasmania.



5. **ELATOSTEMMA**, Forst.

Herbs, rarely shrubby, usually succulent. Leaves distichous, opposite or alternate, unequal-sided; stipules axillary. Flowers minute, unisexual, densely crowded on axillary, fleshy, unisexual involucre.—*Male*: Perianth of 3 or 4 mucronate leaflets. Stamens 4 or 5. Ovary imperfect. *Female*: Perianth minute, imperfect. Stamens imperfect. Ovary ellipsoid; stigma sessile, penicellate; ovule erect. Nut minute, ovate or elliptic, compressed. Seed exalbuminous; cotyledons plano-convex.

A very large tropical genus in Asia, Australia, and the Pacific Islands.

1. **E. rugosum**, *A. Cann.*;—*Fl. N. Z.* i. 304. Erect or decumbent, 1–2 ft. high, stout, succulent, glabrous or puberulous. Stem branching below. Leaves 4–10 in. long, alternate, sessile, narrow obovate-lanceolate or lanceolate, acuminate, curved, auricled at the base and half amplexicaul, deeply serrate or rugose; stipules membranous, lanceolate. Flowers diœcious. *Male*: receptacles discoid, fleshy,  $\frac{1}{2}$  in. diam., surrounded by adnate bracts, solitary or 2 together, sessile or shortly peduncled; perianth pedicelled, hidden amongst membranous bracteoles;—*fem.*: receptacle smaller, more pubescent; perianth nearly sessile; stigma capitate.

**Northern** Island: in dense moist woods, abundant, *Banks and Solander*, etc. Closely allied to an Australian and South Sea Island species.

ORDER LXXII. **CHLORANTHACEÆ.**

Herbs or small shrubs. Leaves evergreen, opposite, the petioles connate at the base, usually serrated, stipulate. Flowers minute, green, uni- or bisexual, in terminal and axillary spikes.—Bracts boat-shaped or 0. Perianth 0. Stamens 1–3, epigynous in hermaphrodite flowers; filament very short; anthers bursting laterally or inwards. Ovary sessile, 1-celled; stigma sessile, obtuse, deciduous; ovule 1, pendulous. Drupe small, fleshy, 1-seeded. Seed with a membranous testa, fleshy albumen, and minute embryo.

A very small, tropical and subtropical Order.

1. **ASCARINA**, Forst.

Flowers diœcious, loosely spiked; bract small.—Stamen 1. Anther linear-oblong, 2-celled, bursting laterally. Ovary ovoid.

1. **A. lucida**, *Hook. f. Fl. N. Z.* i. 228. A small tree or shrub, 12–14 ft. high, everywhere perfectly glabrous, evergreen and shining; branches terete. Leaves  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, oblong or oblong-lanceolate, acute or obtuse, coarsely obtusely serrate, rather glaucous below; stipules subulate. Spikes  $\frac{1}{4}$ –8 in. long, solitary or racemed.

**Northern** Island: Totara-nui, *Banks and Solander*; swamps in the Wairarapa valley, *Colenso*. **Kermadec** Islands, *M<sup>c</sup>Gillivray*. I find that the Kermadec Island plant with larger leaves, which I distinguished as *A. lanceolata*, (*Journ. Linn. Soc.* i. 129) is only a variety of the New Zealand one. Dr. Seemann refers a Fiji Island plant to the same.

## ORDER LXXIII. PIPERACEÆ.

Herbs or shrubs, often aromatic. Leaves alternate opposite or whorled, with or without stipules. Flowers most minute, usually crowded on very slender catkins, amongst minute, angular, flat-topped scales.—Perianth 0. Stamens 2 or more; filaments very short. Ovary 1-celled; style 0 or very short, stigma entire or 2–6-lobed, capitate or plumose; ovule 1, erect. Berry 1-seeded. Seed with fleshy or horny albumen and minute embryo.

A considerable tropical and subtropical Order.

Small herb. Leaves succulent. Stigma deciduous . . . . . 1. PEPEROMIA.  
Shrub, aromatic. Leaves membranous. Stigmas 2–5 . . . . . 2. PIPER.

## 1. PEPEROMIA, Ruiz and Pavon.

Succulent herbs. Leaves opposite alternate or whorled. Flowers hermaphrodite.—Bracts peltate. Stamens 2. Ovary sessile; stigma sessile, deciduous, pencilled. Berry sessile.

A large genus, found in all tropical parts of the world.

1. **P. Urvilleana**, *A. Rich.*;—*Fl. N. Z.* i. 228. A small, glabrous or puberulous, succulent herb, 4–10 in. high, creeping, branched. Leaves alternate, shortly petioled,  $\frac{1}{2}$ –1 in. long, broadly obovate or elliptic-oblong, obtuse, 3-nerved at the base. Catkin peduncled, axillary, solitary, erect, 1–1 $\frac{1}{2}$  in. long.

**Northern** Island: common in damp woods, on mossy trees, rocks, etc., *Banks and Solander*, etc. **Kermadec** Islands, *M'Gillivray*. Also a Norfolk Island plant, and closely allied to some Pacific Island and Australian species.

## 2. PIPER, Linn.

Small trees, or climbing or erect shrubs. Leaves alternate, petioled; stipules adnate or deciduous. Flowers hermaphrodite or unisexual.—Bracts nearly sessile. Stamens 2. Ovary sessile, ovoid; stigmas 2–5.

A very large tropical genus, to which the Black and Betle Peppers belong, and the Kava of the South Sea Islands.

1. **P. excelsum**, *Forst.*;—*Fl. N. Z.* i. 228. A large bush or small tree, often 20 ft. high, quite glabrous, very aromatic. Stem flexuose, jointed. Leaves 3–5 in. long, broadly ovate-cordate, acuminate, 5–7-nerved at the base; petioles 1–2 in. long; winged by the adnate stipules at their bases. Catkins solitary or 2 together, axillary, erect, strict, slender, 1–4 in. long. Berries yellow.

**Northern and Middle** Islands: as far south as Canterbury, *Banks and Solander*, etc. **Kermadec** Islands, *M'Gillivray*. Also found in Norfolk Island and Lord Howe's Island. The plant which I referred to *P. macrophyllum*, in a short account of the vegetation of the Kermadec group (*Linn. Journ.* i. 127), is, I think, only a large state of this. The leaves are eaten, but seeds rejected. Leaves used as Tea, etc., to cure toothache.

## ORDER LXXIV. BALANOPHOREÆ.

Stout, succulent, leafless root-parasites. Stem reduced to a tuberous, often lobed Potato-like rhizome, giving off simple, thick, erect scapes, often bearing concave scales, and at the top ovoid, spikes or spadixes of minute, unisexual, very imperfect flowers.—*Male* fl. : Perianth 0 or 3-cleft, lobes valvate. Stamens 1–3; filaments free or united, short or long; anthers 2–many-celled. Ovary 0. *Female* fl. : minute. Calyx adherent, with a lobed limb or 0. Ovary ovoid or globose, 1-celled, styles 1 or 2; stigmas simple; ovule 1, pendulous. Fruit a very minute nut or utricle enclosing an adherent seed, usually consisting of a homogeneous mass of granular albumen; embryo when found excessively minute, lodged in the albumen.

A small Order of chiefly tropical root-parasites; one is a native of the Mediterranean, *Cynomorium*, the “Fungus Meliteusis” of the Crusaders. The only New Zealand genus is a most remarkable one, found nowhere else.

## 1. DACTYLANTHUS, Hook. f.

A fleshy root-parasite; rhizome subterranean, globular or misshapen, tubercled, giving off numerous club-shaped peduncles or stems, covered with concave, obtuse, imbricating scales, the upper larger and surrounding the spadixes.—Flowers minute, diœcious, crowded on erect, columnar spadixes. *Male* : a solitary, almost sessile, 2-celled anther. *Female* : Perianth adnate to the globose ovary, limb of 2 or 3 superior subulate lobes; style filiform, stigma simple.

1. **D. Taylori**, Hook. f. in *Trans. Linn. Soc.* xxii. 427. t. 75. Rhizome as big as the fist or smaller; stems 2–4 in. high; scales ovate, lower smaller, shorter,  $\frac{1}{4}$  in. long; upper more oblong, larger, 1 in. long. Spadixes cylindric, numerous, crowded at the top of the stem, hidden by the uppermost scales, 1–1 $\frac{1}{2}$  in. long; *male* covered by crowded anthers;—*fem.* by the erect, slender ovaries.

**Northern** Island: Wanga-nui, alt. 4000 ft., on roots of *Fagus* and *Pittosporum*, Rev. R. Taylor. Native name “*Pua reinga*.”

## ORDER LXXV. CONIFERÆ.

Shrubs or trees, usually resinous. Leaves stiff, very various, often reduced to scales.—Flowers monœcious or diœcious, very minute and imperfect; males reduced to crowded naked stamens; anthers 2- or more celled. *Female* of one or more naked ovules, without ovary style or stigma, inserted on coriaceous scales, which are solitary or spiked, or collected into catkins or cones. Ripe seeds nut- or drupe-like; testa membranous, crustaceous or osseous; albumen copious; embryo usually terete; cotyledons 2 or more.

A very extensive Order, found in all parts of the world, to which the Yew, Juniper, Pine, Cypress, etc. etc., belong.

Leaves oblong, 1–3 in. Cones large, of many imbricating scales . . . 1. DAMMARA.

Leaves small. Cone of few, erect, woody scales . . . . . 2. LIBOCEDRUS.

- Leaves linear or scale-like. Drupe inverted, adnate to a fleshy peduncle . . . . . 3. *PODOCARPUS*.  
 Leaves linear or scale-like. Nuts erect, in fleshy cups . . . . . 4. *DACRYDIUM*.  
 Leaves fan-shaped. Nuts on the leaves, erect, in fleshy cups . . . . 5. *PHYLOCLADUS*.

### 1. *DAMMARA*, Linn.

Lofty trees. Leaves, when young distichous, flat, coriaceous, with numerous parallel veins. Cone large.—Inflorescence diœcious. *Male*: cylindric catkins of sessile imbricated stamens; anthers of 8–15 cells, pendulous from a peltate connective. *Female*: terminal, cones ovoid obovoid or globose, formed of many closely imbricating, woody or coriaceous, deciduous scales. Ovule solitary at the base of each scale, inverted. Seed unequally winged.—*Agathis*, Salisb.

A considerable genus, confined to Australia, New Zealand, the Malayan and Fiji islands, New Caledonia, and New Hebrides.

1. *D. australis*, *Lambert*;—*Fl. N. Z.* i. 231. A very large, lofty tree, 120 ft. high; trunk sometimes 10 ft. diam.; branches whorled in the young plant; bark thick, very resinous. Leaves coriaceous, sessile, lanceolate, in young plants, 2–3 in. long, in old oblong or obovate, 1–1½ in. long, glaucous. *Male* cones 1 in. long;—*fem.* obovoid or club-shaped, 2–3 in. long.—*Podocarpus zamiaefolius*, A. Rich.

**Northern** Island: east coast, from Mercury Bay northwards, *Banks and Solander*, etc. The famous Kauri or Kauri Pine. Though not now found south of Mercury Bay, the gum was stated (Mr. Haast thinks erroneously) to be dug up in the Middle Island. The great lumps now found in the Northern Island are said to be much larger than the existing trees produce.

### 2. *LIBOCEDRUS*, Endl.

Trees or shrubs. Branches compressed when young, 4-gonous when old, imbricate.—Inflorescence monœcious. *Male*: cylindric catkins of 6 or 7 stamens; anthers sessile, of 4 cells pendulous from a peltate connective. *Female*: terminal cones formed of 4 erect woody persistent scales, the alternate smaller. Ovules 2 at the base of each scale, erect. Seeds solitary at the base of each scale, compressed, unequally winged.

A small genus, consisting of two Chilean and two New Zealand species.

- Branchlets all much compressed . . . . . 1. *L. Doniana*.  
 Branches for the most part 4-gonous . . . . . 2. *L. Bidwillii*.

1. *L. Doniana*, Endl.—*Thuja Doniana*, Hook.; *Fl. N. Z.* i. 231. A tree, 60–100 ft high and 8–10 ft. circumference; bark flaking off and stringy, wood fine-grained, heavy, dark-coloured; branches distichous, vertical and flat in young plants (like the *Arbor-Vitæ*), much compressed,  $\frac{1}{10}$  in. broad, fastigiate, more 4-gonous in old plants. Leaves in 4 rows, of two sizes, the lateral larger, those in the upper and lower faces of the branches very small. Cones ovate, obtuse,  $\frac{1}{2}$  in. long; scales with a sharp curved spine at the back.—*Thuja Doniana*, Hook. *Lond. Journ. Bot.* i. 571. t. 18; *Dacrydium plumosum*, Don.

**Northern** Island: forests on the Bay of Islands, *Bennett, A. Cunningham*, etc. *Hokianga, Edgerley*. Wood said to be excellent both for planks and spars.



2. **L. Bidwillii**, *Hook. f.* Young leaves and branches similar to *L. Doniana*, but not so broad, old branches with fastigiate 4-gonous twigs,  $\frac{1}{16}$  in. diam.

**Northern Island**: Ruahine mountain, *Colenso*. **Middle Island**: abundant from the Nelson mountains, where it ascends to 6000 feet, *Bidwill*, to Otago, where, at Dunedin, it descends to 2000 ft. Haast's Pass, alt. 1000 ft., *Haast*. I advance this species with much hesitation; it is difficult to suppose that a timber-tree described as having excellent wood, and growing at the Bay of Islands at the level of the sea (I gathered *L. Doniana* on the banks of the Kawa-kawa river), should be the same as one inhabiting the mountains of the Middle Island, and described by Buchanan as having soft, worthless wood; but I can find very little difference between the specimens. The fruiting and other branches of all my specimens of *L. Doniana* are flat; of some of those of *L. Bidwillii* also flat; but of most, including all the fruiting ones, tetragonous. This is a character however of little importance in these Conifers. My cones of *L. Bidwillii* are unripe, and therefore can only be compared with unripe ones of *Doniana*, which they entirely resemble. Buchanan says that the heartwood of *L. Bidwillii* is so soft that soap-bubbles may be blown through a foot length of it. *Colenso* says his Ruahine mountain plant is quite distinct from the Bay of Islands one, and is called "Pahautea," but gives no distinctive characters.

### 3. PODOCARPUS, L'Héritier.

Trees or shrubs. Leaves very various, scattered or imbricate or distichous, large or minute, often of 2 forms on each plant or branch of the plant. —Inflorescence diœcious or monœcious. *Male*: axillary or terminal, spiked racemed or solitary cylindric cones, formed of imbricating stamens; anthers sessile; cells 2, pendulous from a peltate connective. *Female*: a short rachis, with 1 or 2 scales, each bearing an inverted ovule adnate to its face. Drupe inverted, with a ridge on one side (the adnate scale), seated on a fleshy peduncle.

A considerable genus, found in various mountain-districts of the tropics, in Japan, and in the south temperate zone commonly, but not in Eastern Asia, Europe, or North America.

Leaves uniform, all linear. Male catkins solitary or 2 or 3.

Leaves distichous, falcate,  $\frac{1}{2}$ – $\frac{3}{4}$  in., acute . . . . . 1. *P. ferruginea*.

Leaves imbricate, erect or recurved,  $\frac{1}{4}$ – $\frac{1}{2}$  in., obtuse . . . . . 2. *P. nivalis*.

Leaves distichous or imbricate,  $\frac{1}{2}$ – $1\frac{1}{2}$  in., rigid, pungent . . . . . 3. *P. Totara*.

Leaves uniform, distichous, linear, obtuse. Male catkins spiked . . . . . 4. *P. spicata*

Leaves some  $\frac{1}{6}$  in. distichous, falcate, others  $\frac{1}{12}$  in., imbricate . . . . . 5. *P. dactyloides*.

1. **P. ferruginea**, *Don*;—*Fl. N. Z.* i. 232. A lofty timber-tree, 50–80 ft. high; trunk 3 ft. diam.; bark rather scaling; wood brittle, close-grained, durable, reddish. Leaves distichous, linear, acute, falcate, 1-nerved,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, red-brown when dry. *Male* catkins axillary, solitary, shorter than the leaves; connective obtuse. Drupe  $\frac{3}{4}$  in. long, red-purple, glaucous.—*Hook. Ic. Pl.* t. 542.

**Northern Island**: common in woods, *Banks and Solander*, etc. **Middle Island**: Otago, ascending to 1000 ft. "Black Pine" of the colonists, *Hector and Buchanan*. Drupes taste of turpentine, greedily eaten by birds.

2. **P. nivalis**, *Hook. f.* *Fl. N. Z.* i. 232. A small, woody, densely branched shrub, 1–20 ft. high; trunk 3 ft. diam. Leaves not distichous, spreading or recurved, very thick and coriaceous,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, linear-oblong, obtuse, apiculate; midrib stout, green when dry. *Male* catkins short, often 3 together; connective obtuse. Drupe apparently dry.—*Hook. Ic. Pl.* t. 582.

**Northern Island**: on the mountains, Tongariro, *Bidwill*; Ruahine range, *Colenso*. **Middle Island**: Southern Alps, alt. 2500–5000 ft., *Sinclair and Haast*; forming much of the subalpine forest; Wairau mountains, alt. 4–5000 ft., *Travers*. Perhaps an alpine form of *P. Totara*; Otago, *Hector and Buchanan*. Very nearly allied to the Tasmanian *P. alpina*.

3. **P. Totara**, *A. Cunn.*;—*Fl. N. Z.* i. 233. A lofty and spreading tree, 60 ft. high; trunk 2–4 ft. diam.; bark rather flaking; wood red, close-grained, very durable. Leaves distichous or not so, very coriaceous, erect, spreading or recurved, straight or falcate  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, linear, acuminate, pungent; midrib indistinct, pale-green when dry. *Male* catkins short, stout, obtuse, solitary or 2 or 3 together, bracteate at the base; connective toothed. Drupes solitary or 2, on a swollen peduncle as big as a cherry.—*Hook. Lond. Journ. Bot.* i. 572. t. 19.

Throughout the **Northern** and **Middle** Islands: *Menzies*, etc. Wood the most valuable in the islands. Drupe eaten. Bark used for roofing.

4. **P. spicata**, *Br.*;—*Fl. N. Z.* i. 232. A large tree, 80 ft. high; bark bluish-black, almost smooth; wood white, soft, close, and durable. Leaves more or less distichous,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, linear, straight or falcate, obtuse or apiculate, glaucous below. *Male* catkins numerous, spiked, horizontal. Drupes often spiked, very numerous, globular,  $\frac{1}{3}$  in. diam.—*Hook. Ic. Pl.* t. 543; *Dacrydium taxifolium*, Banks and Sol.; *D. (?) Mai*, *A. Cunn.*

**Northern** and **Middle** Islands: abundant, *Banks and Solander*, etc. “Black Rue” of Otago. Drupe sweet, eatable.

5. **P. dacrydioides**, *A. Rich.*;—*Fl. N. Z.* i. 233. Trees gregarious, very lofty, 150 ft. high, 4 ft. diam.; wood white, soft, spongy. Leaves of 2 forms, of young trees and on twigs of old, distichous,  $\frac{1}{6}$  in. long, linear, falcate, tip turned up and acuminate, nerveless; on old branches imbricated, small, subulate,  $\frac{1}{12}$ – $\frac{1}{6}$  in. long, keeled. *Male* catkins terminal, small,  $\frac{1}{6}$  in., solitary, sessile; connective acute.—Drupe small, gibbous, on swollen peduncles.—*P. thuyoides*, *Br.*

Abundant throughout the **Northern** and **Middle** Islands: in swamps, *Banks and Solander*, etc. Twigs used for eel-baskets. Wood bad. Drupe eaten. The rootlets bear singular minute globular bodies, containing cells with spiral markings. The wood of Otago specimens is described as close-grained and heavy (*Buchanan*).

#### 4. DACRYDIUM, Solander.

Trees or shrubs. Leaves linear and distichous or subulate and imbricating. —Inflorescence diœcious. *Male*: small, terminal, ovoid, solitary cones, formed of imbricating stamens; anthers sessile; cells 2, pendulous from a peltate connective. *Female*: a short rachis, with 1 or more scales, 1 or 2 of which bear an inverted ovule, which becomes erect as it ripens. Nut ovoid, erect, outer coat short, sheathing at its base, sometimes fleshy.

A small genus, confined to the Malayan and Pacific islands, Tasmania and New Zealand.

Lofty tree, branches weeping. Leaves subulate . . . . . 1. *D. cupressinum*.  
A tree, branches erect or spreading. Leaves obtuse . . . . . 2. *D. Colensoi*.  
A small, creeping bush. Leaves lax, obtuse . . . . . 3. *D. laxifolium*.

1. **D. cupressinum**, *Soland.*;—*Fl. N. Z.* i. 233. Tree pyramidal, pale-green; branches weeping; trunk 80 ft. high, 4–5 ft. diam.; bark scaling; wood red, heavy, solid. Leaves closely imbricating all round; on the young

branches, rigid, 3-gonous, decurrent, subulate, curved,  $\frac{1}{6}$  in. long, keeled; on old much smaller, more closely imbricated,  $\frac{1}{12}$ – $\frac{1}{10}$  in. long. Nuts ovoid,  $\frac{1}{8}$  in. long, on the curved tips of the branchlets.—Richard, Conif. 827. t. 2.

Throughout the **Northern** and **Middle** Islands, abundant, *Banks and Solander*, etc. "Red Pine" of Otago colonists. Spruce beer was made of the young branches by Captain Cook; the wood is excellent, the fleshy cup of the nut eatable.

2. **D. Colensoi**, Hook.;—*Fl. N. Z.* i. 234. A tree, 12–40 ft. high, very variable in habit; bark whitish or pale-brown with white patches; wood light, yellowish; branches stout, woody. Leaves of various forms, some linear and spreading,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, obtuse, with stout costa, others small, densely 4-fariously imbricated, triangular, keeled, coriaceous,  $\frac{1}{10}$ – $\frac{1}{12}$  in. long. Male catkins terminal, solitary, sessile; anthers 4–6; connective obtuse. Nut small, on a horizontal resinous cup-shaped disk.—Hook. Ic. Pl. t. 548; *Podocarpus* (?) *biformis*, Hook. Ic. Pl. t. 544.

**Northern** Island: Tongariro and Ruahine range, *Colenso*. **Middle** Island: Nelson mountains, alt. 4–6000 ft., *Bidwill*; alps of Canterbury, alt. 2–4000 ft., *Sinclair and Haast*; Otago, alt. 3000 ft., *Hector and Buchanan*.

3. **D. laxifolium**, Hook. f., *Fl. N. Z.* i. 234. A small, weak, straggling, prostrate shrub; branches trailing, 6–12 in. long, flexible. Leaves as in *D. Colensoi*, but much smaller, linear ones spreading,  $\frac{1}{12}$ – $\frac{1}{10}$  in. long, imbricating ones very broadly ovate or trapeziform, oblong, keeled,  $\frac{1}{24}$  in. long. Nuts small, erect, in red fleshy cups.—Hook. Ic. Pl. t. 825.

**Northern** Island: Tongariro, *Bidwill*; Ruahine range, *Colenso*. **Middle** Island: Nelson mountains, alt. 5000–6000 ft., *Bidwill*; Black Hills, alt. 4000 ft., *Haast*; Otago, *Hector and Buchanan*. Perhaps a small form of *D. Colensoi*.

## 5. PHYLLOCLADUS, Br.

Trees with whorled branches. Leaves of two forms, some minute and scale-like, others linear, seen only in young plants, but which in older are connate into flat fan-shaped or ovate coriaceous organs (phyllodes) resembling simple leaves, which bear the inflorescence on their edges.—Inflorescence monœcious; male and female close together. *Male* as in *Dacrydium*. *Female* a short rachis with a few scales, each bearing a solitary, sessile, erect ovule; girt at the base with a cup-shaped disk. Nut solitary, erect, girt by the fleshy disk and fleshy connate scales.

A small genus, natives of the mountains of Borneo, of Tasmania and New Zealand.

Flowers on the margins of the phyllodes . . . . . 1. *P. trichomanoides*.  
Flowers at the base of the phyllodes . . . . . 2. *P. alpinus*.

1. **P. trichomanoides**, Don;—*Fl. N. Z.* i. 235. A slender tree, 60 ft. high; wood pale, close-grained. Phyllodes distichous, with scales (rudimentary leaves) at their base, very coriaceous,  $\frac{1}{2}$ –1 in. long, obliquely rhomboid cuneate or ovate, simple or pinnatifidly lobed; lobes truncate, erose; veins radiating from one central one outwards. Nuts compressed, solitary, on the margins of the phyllodes.—Hook. Ic. Pl. t. 549, 550, 551; *P. rhomboidalis*, A. Rich. Flora.

**Northern** Island: not rare in forests. *Banks and Solander*, etc. Bark used for dyeing red. Wood excellent, white, used for planks and spars.

2. **P. alpinus**, *Hook. f. Fl. N. Z.* i. 235. *t.* 53. A small, very rigid, densely-branched shrub or small tree, sometimes 2 feet diam. Leaves very much thicker, smaller and more coriaceous than in *P. trichomanoides*, sometimes linear-oblong and only  $\frac{1}{2}$  in. long, often glaucous below. Nuts at the base of the phyllodes, small.

**Northern** Island: Tongariro, *Bidwill*; Ruahine range, *Colenso*. **Middle** Island: Nelson, alt. 6000 ft., *Bidwill*; Wairau mountains, alt. 4-5500 ft., *Travers*, etc.; alps of Canterbury, *Sinclair and Haast*; alt. 2300-5000 ft.; Otago, *Hector and Buchanan*. Perhaps only a form of *P. trichomanoides*, but a very distinct one. Also very closely allied to the Tasmanian *P. asplenifolia*.

## CLASS II. MONOCOTYLEDONS.

### ORDER I. ORCHIDÆ.

Herbs, sometimes almost shrubby, either terrestrial with tubers or bulbs, or epiphytes with leafy branches, which are often thickened and called pseudo-bulbs. Leaves sheathing at the base. Flowers bracteate, extremely various, often beautiful, hermaphrodite.—Perianth superior, of 6 pieces in 2 series, 3 outer (*sepals*) usually nearly equal; of the 3 inner 2 are lateral (*petals*); and the innermost (*lip*) is either largest or differs in shape, direction, or surface; it is sometimes superior (or posticous), at others inferior (or anticous). Axis of the flower occupied by a *column* facing the lip, consisting of a stamen combined with the style and reduced apparently to 2-8 masses of *pollen* contained in a fixed or moveable, deciduous or persistent cap-like anther; pollen cohering in 2-8, often pyriform, waxy or granular masses, often attached in pairs by a caudicle to a gland, which is easily detached from the tip (*rostellum*) of the column. Ovary inferior, 1-celled; stigma a glandular depression or swelling on the front or base of the column, opposite the lip; ovules very numerous on 3 parietal placentas. Capsule 1-celled, 3-valved, many-seeded. Seeds very minute, light, with loose reticulated testa, and a solid embryo.

A very extensive Order, abounding in beautiful plants, the flowers always of curious structure. Theoretically the flower consists of 15 parts: viz. 3 sepals; 3 petals; 3 outer stamens, opposite the sepals, of which, that answering to the sepal opposite the lip is alone developed (the other 2 being suppressed and confluent with the lateral veins of the lip); 3 inner stamens all suppressed, of which 2 are theoretically confluent with the sides of the column, and the 3rd with the midrib of the lip; lastly, 3 stigmas, of which, that opposite the lip is alone developed. The correctness of this theory is supported by the presence of 2 lateral appendages which represent undeveloped stamens on the sides of the column of such genera as *Thelymitra*, *Prasophyllum*, etc., and by three crests or ridges on the lip, representing as many others (as *Chiloglottis*); also by the arrangement and direction of the vascular bundles in the ovary, column, and perianth. For the development of this view, and an account of the wonderful processes by which fertilization is effected in this Order by insects, see Darwin's work 'On the Fertilization of Orchids.'



## 1. ARTIFICIAL KEY TO THE GENERA.

A. *Perennial epiphytes, with evergreen leaves. Pollen waxy, except in 1.*

- Stems slender, leafy. Sepals free. Disk of lip naked. Pollen granular . . . . . 1. *EARINA*.  
 Stem slender, leafy. Lateral sepals adnate with column. Lip with crests on face . . . . . 2. *DENDROBIUM*.  
 Leaves in pairs on pseudobulbs . . . . . 3. *BOLBOPHYLLUM*.  
 Stems very short, leafy. Lip concave, middle lobe solid . . . . 4. *SARCOCHILUS*.

B. *Stems annual; roots terrestrial, bulbous, tuberous, or rarely creeping.*

a. *Leaf solitary, broad, membranous.*

- Flower 1, sessile, purple, large. Sepals very long, filiform . . . 9. *CORYSANTHES*.  
 Flower 1, long-peduncled. Sepals broad, upper concave . . . . 8. *ADENOCILUS*.  
 Flowers few. Sepals and petals acuminate or awned . . . . . 6. *ACIANTHUS*.  
 Flowers few. Sepals and petals linear, obtuse . . . . . 7. *CYRTOSTYLIS*.

β. *Leaf solitary (rarely 0 in Prasophyllum), slender, flat or terete (2 broad in Caladenia bifolia).*

- Leaf tubular. Flowers many, minute, with the lip below . . . 10. *MICROTIS*.  
 Leaf linear or terete. Flowers many, minute, with the lip uppermost 17. *PRASOPHYLLUM*.  
 Leaf flat, pubescent. Flowers 1-4, pink. Lip glandular . . . 11. *CALADENIA*.  
 Leaf terete, thick. Flowers 1 or more, yellow or blue. Lip sepals and petals all similar . . . . . 15. *THELYMITRA*.

γ. *Leaves 2 or more, rarely 0 in Pterostylis (see Caladenia bifolia, in β).*

- Flower solitary, large, green, galeate. Lip small, narrow . . . 12. *PTEROSTYLIS*.  
 Flower solitary. Upper sepal arched. Lip with large, purple glands 13. *CHILOGLOTTIS*.  
 Flowers several. Upper sepal galeate. Lip with 5 ridges . . . 14. *LYPERANTHUS*.  
 Flowers several. Upper sepal galeate. Lip 3-lobed . . . . . 18. *ORTHOCERAS*.  
 Flowers numerous. Upper sepal oblong. Lip with crumpled edges 16. *SPIRANTHES*.

δ. *Leaves 0. Stem stout, with brown sheathing scales.*

- Flowers numerous, brown. Sepals united in an urceolate tube . . 5. *GASTRODIA*.

## 2. NATURAL CLASSIFICATION OF THE GENERA.

1. Anther terminal, deciduous. Pollen masses granular, attached to a short caudicle :—  
 1, *EARINA*.  
 2. Anther terminal, deciduous. Pollen masses waxy, attached to a broad caudicle :—  
 2, *DENDROBIUM*; 3, *BOLBOPHYLLUM*; 4, *SARCOCHILUS*.  
 3. Anther terminal, deciduous. Pollen masses of large loose grains, without caudicle :—  
 5, *GASTRODIA*.  
 4. Anther terminal, persistent. Pollen masses attached by their bases to the stigmatic gland :—6, *ACIANTHUS*; 7, *CYRTOSTYLIS*; 8, *ADENOCILUS*; 9, *CORYSANTHES*; 10, *MICROTIS*; 11, *CALADENIA*; 12, *PTEROSTYLIS*; 13, *CHILOGLOTTIS*; 14, *LYPERANTHUS*.  
 5. Anther parallel to the stigma, at the back of the column, persistent. Pollen masses attached by threads to the stigmatic gland :—15, *THELYMITRA*; 16, *SPIRANTHES*, 17, *PRASOPHYLLUM*; 18, *ORTHOCERAS*.

1. *EARINA*, Lindley.

Rigid, erect, tufted epiphytes. Stems leafy, simple, compressed. Leaves distichous, narrow linear, numerous. Flowers small, whitish, in terminal simple or branched bracteate spikes or panicles.—Sepals and petals nearly equal, spreading, ovate or oblong. Lip superior, sessile or shortly stalked, 3-lobed, disk eglandular, lateral lobes incurved. Column short. Pollen-masses 4, granular, united in pyriform pairs to a small short caudicle, which comes away with them.

A small genus, confluent, as at present known, to New Zealand. The two species were confounded by Cunningham.

Leaves 4-6 in. long, acuminate. Panicles slender . . . . . 1. *E. mucronata*.  
 Leaves 2-3 in. long, obtuse or acute. Panicle stiff . . . . . 2. *E. autumnalis*.

1. ***E. mucronata*, Lindl.**;—*Fl. N. Z.* i. 239. Stems slender, 1-3 ft. long, two-edged. Leaves narrow linear or strap-shaped, 4-6 in. long,  $\frac{1}{5}$  in. broad, acuminate. Panicle slender, sparingly branched. Flowers remote,  $\frac{1}{4}$  in. diam.; bracts obtuse. Sepals and petals linear-oblong. Lip deeply 3-lobed, spotted.—Hook. Ic. Pl. t. 431.

Common throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc.

2. ***E. autumnalis*, Hook. f.** *Fl. N. Z.* i. 239. Stems stout, 1-1½ ft. high, slightly compressed. Leaves narrow linear, 2-3½ in. long,  $\frac{1}{3}$  in. broad, rigid, nerved and striated. Panicle short, stiff, usually distichously branched. Flowers as in *E. mucronata*, but crowded, white, speckled; bracts short, obtuse, imbricated. Sepals broadly oblong. Petals ovate. Lip broad, obscurely 3-lobed, retuse.

Throughout the **Northern** and **Middle** Islands, not uncommon, *Banks and Solander*, etc.

## 2. DENDROBIUM, Linn.

Rigid, tufted, epiphytes. Stem stout or slender, leafy. Leaves distichous, numerous, usually narrow. Flowers paniced racemed or axillary and solitary, usually large and handsome.—Sepals spreading, the lateral adnate to the base of the column. Petals usually smaller. Lip inferior or superior, sessile and jointed on to the base of the column or adnate to it, usually large and 3-lobed, disk often with ridges or plates. Column semiterete, usually produced at the base. Pollen-masses 4, adhering in pairs to a strap-shaped caudicle.

A very large Asiatic, Australian, and Pacific Island tropical and subtropical genus, containing many most beautiful species, cultivated extensively in England; these differ greatly in habit, foliage, and inflorescence.

1. ***D. Cunninghamii*, Lindl.**;—*Fl. N. Z.* i. 240. Stems tufted, pendulous, slender, rigid, polished, branched, 1-2 ft. long. Leaves numerous, 1-1½ in. long,  $\frac{1}{5}$  in. broad, linear, acuminate, pale green, striated, 3-nerved. Flowers in axillary slender 2- or many-flowered racemes, which are shorter than the leaves,  $\frac{3}{4}$  in. diam., pale rose-coloured; pedicels slender; bracts short. Sepals acute, upper narrow, lower broad produced into a short spur behind. Petals as long, oblong, obtuse. Lip with a short claw, adnate to the lateral sepals and column, 3-lobed, lateral lobes small, middle broader than long, wavy, retuse or truncate; disk with 5 plates.—*D. biflorum*, A. Rich. not Swartz.

Throughout the **Northern** and **Middle** Islands. abundant, *Banks and Solander*, etc. Very nearly related to the South Sea Island *D. biflorum*.

## 3. BOLBOPHYLLUM, Thouars.

Very coriaceous, tufted epiphytes, with running matted stems bearing fleshy green tubers (pseudobulbs), each crowned with 1 or 2 leaves.—Flowers soli-

tary or spiked on a scape rising from the base of the pseudobulb; their structure very similar to *Dendrobium*, but the column is very short, produced at the tip into 2 short horns.

A large genus, with the same distribution as *Dendrobium*.

1. *D. pygmæum*, *Lindl.*;—*Fl. N. Z.* i. 240. Minute, forming patches on mossy trunks of trees. Pseudobulbs as large as a pea. Leaf solitary, sessile, coriaceous, linear-oblong,  $\frac{1}{4}$  in. long, grooved down the middle. Flowers minute, solitary, on a short bracteate scape. Upper sepal convex, subacute; lateral, broadly ovate, acute. Petals shorter, linear-oblong, obtuse. Lip ovate, obtuse, disk with thickened lines down the centre. Ovary gibbous, hairy.—*Dendrobium pygmæum*, *Smith.*

Throughout the **Northern** and **Middle** Islands: common, *Banks and Solander*, etc.

#### 4. SARCOCHILUS, Br.

Small, coriaceous epiphytes. Stems short. Leaves distichous, linear-oblong. Flowers large or small, in bracteate spikes or racemes.—Perianth fleshy, open. Sepals nearly equal, obtuse, lateral adnate to the base of the lip. Petals smaller, obtuse. Lip continuous with the column, concave, fleshy; spur 0. Column short, erect. Anther terminal. Pollen-masses 4, waxy, cohering in globose pairs, attached to a broad strap-shaped caudicle, which is fixed to the gland of the stigma.

A small genus, native of subtropical Australia, the Fiji and Malay Islands.

1. *S. adversus*, *Hook. f. Fl. N. Z.* i. 241. Roots long, wiry, straggling. Stems short, 1–2 in. long. Leaves few, linear-oblong, obtuse or subacute, 1–2 in. long, jointed near the base when dry. Scape 1–2 in. long, subterminal, slender. Spike 1 in. long, 10–20-flowered, rachis thickened. Flowers minute, yellow-green,  $\frac{1}{16}$  in. diam. Sepals oblong-ovate, obtuse. Petals linear-oblong, obtuse. Lip subquadrate, obscurely lobed.

**Northern** Island: Oporagi, *Banks and Solander*; Bay of Islands and Wairanaka Valley, *Colenso, Edgerley*. A very small-flowered species, compared with the Australian.

#### 5. GASTRODIA, Br.

Tall, slender, leafless, whitish or brown terrestrial herbs. Root long, thick, fleshy, twisted, or tuberous. Stem with sheathing brown scales. Flowers racemed, pendulous, dirty-white or brownish.—Perianth gibbous at the base, subcampanulate or urceolate. Sepals united into a tube to near their tips, which are shortly reflexed; petals smaller, adnate to the tube, their tips reflexed exserted. Lip included, superior, clawed, linear-oblong; margins crenulate. Column short or long, scarcely winged, without lateral appendages. Anther terminal, horizontal, 2-celled, deciduous. Pollen-masses 4, united in pairs, curved, free, composed of very large grains. Stigma at the base of the column, with a free opening to the ovary. Ovary small.

A curious genus, found in Australia and Tasmania, New Zealand, and the Indian Islands.

1. *G. Cunninghamii*, *Hook. f., Fl. N. Z.* i. 251. Root sometimes 18 in. long, very stout. Stem 1–2 ft. high; scales scarious, short, distant, al-

ternate or opposite and connate. Racemes 6–10 in. long. Flowers 10–20, dirty-green, spotted with white; bracts short, scarious. Perianth fleshy,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long. Claw of lip winged, blade linear-oblong, membranous, waved, with 2 thick ridges down the middle. Column very short.—*G. sesumoides*, Br. ? A. Cunn.

**Northern** and **Middle** Islands: in damp shaded woods, not uncommon, but easily overlooked; Bay of Islands, etc., *A. Cunningham*; Port Preservation, *Lyall*; Haast's Pass, Lake Wanaka, etc., *Haast*. The root is full of starch and mucilage, and was eaten by the natives. Odour of plant aromatic but disagreeable (*Haast*).

## 6. ACIANTHUS, Br.

Slender, small, flaccid herbs. Root of tubers at the end of long fibres. Leaf 1, sessile, cordate. Racemes few-flowered. Flowers rather large, green or brown, spreading.—Sepals and petals slender, acuminate or curved, upper sepal sometimes broad. Lip pendulous, or pointing forwards, entire, with 2 glands at the base, and sometimes a glandular disk or tip. Columns slender, terete, arched. Anther small, terminal. Pollen-masses 8, or 4 each 2-partite, powdery.

A small Australian, Tasmanian, and New Zealand genus.

1. **A. Sinclairii**, *Hook. f. Fl. N. Z. i. 246*. Stem 1–3 in. high, very delicate. Leaf broadly cordate, deeply 2-lobed at the base, acuminate,  $\frac{1}{2}$ –1 in. long. Flowers 2–6, green,  $\frac{1}{6}$ – $\frac{1}{4}$  in. diam. Bracts short, ovate, acute. Sepals linear-subulate, aristate, upper broad, 3-nerved; lateral narrower, 1-nerved, toothed towards the tip. Petals small, lanceolate. Lip ovate-lanceolate, with 2 glands at the base, and a thickened tip.

Common throughout the **Northern** Island. **Kermadec** Island: *M. Gillivray*.

## 7. CYRTOSTYLIS, Br.

Habit of *Acianthus*, but sepals and petals not acuminate or awned, and column winged above.

A small genus of Australian, Tasmanian, and New Zealand plants.

Leaf oblong . . . . . 1. *C. oblonga*.  
Leaf orbicular, deeply 2-lobed at the base . . . . . 2. *C. rotundifolia*.

1. **C. oblonga**, *Hook. f. Fl. N. Z. i. 246*. Very slender, 1–3 in. high. Leaf oblong or oblong-cordate, obtuse or acute, cordate or rounded at the base. Flowers 1–3, nearly  $\frac{1}{2}$  in. diam. Sepals and petals nearly equal, narrow linear, acute. Lip as long as the sepals, linear-oblong, obtuse or rather truncate at the tip, with 2 small glands at the base.

**Northern** Island and northern parts of the **Middle** Island: frequent in shaded woods, *Sinclair*, *Colenso*, *Travers*, etc.

2. **C. rotundifolia**, *Hook. f. Fl. N. Z. i. 246*. Quite similar to *C. oblonga*, but the leaf is orbicular, and often 1–1 $\frac{1}{2}$  in. diam.

**Northern** Island: east coast, Raukawa ridge, Cape Kidnapper, etc., *Colenso*. My *C. macrophylla* is, I think, nothing but a large state of this, which may itself prove to be a variety of *C. oblonga*.



8. **ADENOCHILUS**, Hook. f.

A very slender glabrous herb. Stem simple, with one sessile, ovate, acute leaf in the middle, 1-flowered.—Perianth downy. Upper sepal concave, acuminate, adnate to the back of the column; lateral oblique, 3-nerved, lanceolate, placed under the lip. Petals suberect, linear-lanceolate. Lip shortly clawed, 3-lobed, middle lobe caudate, disk and middle lobe with about 4 rows of stipitate glands. Column slender, curved, winged; wings produced upwards into 2 toothed lobes. Anther hidden behind the stigma and between the lobes of the column, persistent. Ovary very long, erect.

A curious genus, of but one species, allied to *Caladenia*, *Chiloglottis*, and the Australian genus *Eriochilus*.

1. **A. gracilis**, Hook. f. *Fl. N. Z.* i. 246. t. 56 A. Stem 6–10 in. high. Leaves membranous, acute,  $\frac{3}{4}$  in. long; sheath short. Stem above the leaf with one sheathing bract in the middle, and another at the base of the peduncle. Ovary  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Perianth  $\frac{1}{2}$  in. broad; segments all very acuminate, veined. Lip small, concealed within the perianth. Anther orbicular, mucronate.

**Northern** Island: Bay of Plenty, *Colenso*.

9. **CORYSANTHES**, Brown.

Very small, delicate, succulent, terrestrial herbs. Root of small tubers on slender caulicles. Leaf 1, very broad. Flower 1, large, purple, almost sessile on the leaf; peduncle elongating after flowering.—Upper sepal very large, long, curved forward from the base, narrow boat- or helmet-shaped; lateral free or connate at the base, very small, or long and filiform. Petals usually very small. Lip very concave or involute, usually fimbriate at the edges. Column short or slender. Anther terminal, 1-celled, persistent. Pollen-masses 4, powdery.

A remarkable genus of beautiful little plants, natives of the Malayan islands, temperate Australia, and New Zealand. The genus *Nematoceras*, established in the New Zealand Flora, I think merges into *Corysanthes* through the Malayan species. The species are difficult of discrimination, and perhaps are not all permanently distinct.

Leaf reniform, 3-lobed at the tip. Lip 2-partite, recurved . . . . .	1. <i>C. triloba</i> .
Leaf oblong-ovate; petiole short. Lip convolute, truncate, toothed . . . . .	2. <i>C. oblonga</i> .
Leaf orbicular-cordate . . . . .	3. <i>C. rotundifolia</i> .
Leaf ovate-oblong orbicular or cordate; petiole short. Lip tubular, recurved . . . . .	4. <i>C. rivularis</i> .
Robust. Leaf large, cordate; petiole and scape very thick. Lip broad, recurved, undulate . . . . .	5. <i>C. macrantha</i> .

1. **C. triloba**, Hook. f.—*Nematoceras*, *Fl. N. Z.* i. 250. Leaf  $\frac{3}{4}$ –1  $\frac{1}{4}$  in. diam., membranous, orbicular-reniform, 3-lobed at the very tip; middle lobe acute; petiole  $\frac{1}{2}$ –3 in. long. Peduncle sometimes 8 in. long after flowering. Flower  $\frac{1}{3}$  in. long. Lateral sepals and petals filiform, sometimes 2 in. long, 5 times longer than the lip; upper dilated and obtuse at the tip. Lip very large, of 2 large recurved lobes, margins nearly entire. Column very small.

**Northern** Island: damp woods, east coast, Cape Palliser, Cape Titikura, etc., *Colenso*; Auckland, *Sinclair*; Otago, *Hector* and *Buchanan*. The Middle Island specimens alluded

to in Fl. N. Z., I think are rather referable to *C. macrantha*, which differs in the much larger size, very coriaceous, rarely 3-lobed leaf.

2. **C. oblonga**, *Hook. f.*—*Nematoceras*, Fl. N. Z. i. 249. t. 57 B. Leaf  $\frac{3}{4}$ –1½ in. long, sessile, membranous, ovate-oblong, apiculate, rarely subcordate at the base. Flower small,  $\frac{1}{3}$ –½ in. long, on a short scape. Upper sepal rather narrow; lateral and petals filiform,  $\frac{3}{4}$ –1 in. long. Lip involute and truncate, when spread out broadly cordate, deep blood-red; margin pale, toothed. Column short, curved.

**Northern** Island, *Edgerley*; interior, *Colenso*; Auckland, *Captain Haultain*. **Middle** Island: Nelson, *Travers*; Otago, *Hector* and *Buchanan*.

3. **C. rotundifolia**, *Hook. f.*—*Nematoceras*, Fl. N. Z. i. 251. Leaf sessile or petioled,  $\frac{1}{3}$ –1 in. diam., membranous, orbicular, acute or apiculate, cordate or 2-lobed at the base. Flower subsessile, very small,  $\frac{1}{4}$ –½ in. diam. Upper sepal rather narrow, lateral and petals filiform. Lip involute, truncate as in *C. oblonga*.

**Northern** Island: Manawata harbour, etc., *Colenso*. **Middle** Island: Nelson, *Travers*. **Lord Auckland's** group and **Campbell's** Islands, *J. D. H.* Perhaps a variety of *C. oblonga*.

4. **C. rivularis**, *Hook. f.*—*Nematoceras*, Fl. N. Z. i. 251. Leaf nearly sessile, orbicular ovate ovate-cordate or oblong-cordate, obtuse acute or acuminate, membranous, often 2-lobed at the base. Flower  $\frac{1}{3}$ –½ in. long. Upper sepal narrow, acuminate; lateral and petals filiform, 1–1½ in. long. Lip involute, when spread open trowel-shaped, recurved; tip retuse or apiculate; margins undulate.—*Acianthus rivularis*, *A. Cunn.*

**Northern** and **Middle** Islands: common on mossy trees, etc., in shady ravines. **Lord Auckland's** group, *Bolton*.

5. **C. macrantha**, *Hook. f.*—*Nematoceras*, Fl. N. Z. i. 249. Much the largest and stoutest species, often 6–10 in. high. Leaf usually with a long very stout petiole, 1–1½ in. broad, coriaceous or fleshy, oblong-orbicular, cordate or 2-lobed at the base, obtuse or apiculate, rarely 3-lobed, with a broad thickened margin, much reticulate. Flowers on short scapes at the base of the petiole, ½–1 in. long, lurid purple. Upper sepal narrow, acuminate; lateral and petals very narrow linear, almost filiform, 1–2 in. long. Lip large, recurved, very broad, almost 2-lobed, strongly undulate.

Throughout the central parts of the **Northern** and all the **Middle** Island: not uncommon in damp shady woods, *Colenso*, etc. **Lord Auckland's** group, *Bolton*.

## 10. MICROTIS, Banks and Solander.

Erect, slender, green herbs. Root of oblong tubers. Leaves 1–2 in., very slender, sheathing at the base. Flowers minute, green, spiked, fleshy, spreading.—Sepals: upper connivent with the petals, and together with them forming a hood; lateral placed under the lip. Petals small, ascending. Lip pendulous, small, entire, sessile, with 2 thickened glands at the base. Column short, with 2 lateral lobes; anther terminal. Pollen-masses 4, powdery.

A genus of several Australian and a few New Caledonian, Java, and New Zealand species.

1. **M. porrifolia**, *Sprengel*;—*Fl. N. Z.* i. 245. Very variable in

stature, robustness, and number of flowers, 6–24 in. high. Leaf solitary, terete, tubular. Spike 1–6 in. long, 20–80-flowered. Flowers  $\frac{1}{2}$  in. long; bracts very short. Upper sepal broadly ovate. Lip oblong, obtuse, crenate or crisped, rounded or obscurely 2-lobed at the tip, with 2 glandular lumps at the base and 1 towards the tip.—*M. Banksii*, A. Cunn.; *Epipactis porrifolia*, Swartz; *Ophrys unifolia*, Forst.

Throughout the **Northern** and **Middle** Islands: abundant, *Banks and Solander*, etc.

## 11. CALADENIA, Br.

Slender, small, pubescent pilose or villous herbs. Roots of small tubers terminating underground caulicles. Leaf solitary (rarely 2), radical or cauline, sheathed at its base. Scape 1–4-flowered; bract 1 or 0.—Perianth open, suberect, 2-lipped, glandular. Upper sepal erect or arched, lateral placed under the lip. Petals erect or spreading. Lip clawed, concave, 3-lobed, obovate or trowel-shaped; disk with rows of stipitate glands. Column slender, curved, winged above. Anther terminal, exposed, mucronate. Pollen-masses 4.

A large extratropical Australian, Tasmanian, and New Zealand genus.

Leaf solitary, linear. Scape very slender. Flower  $\frac{1}{4}$ – $\frac{1}{2}$  in. : . . . . 1. *C. minor*.  
 Leaf solitary, linear. Scape stout. Flower  $\frac{1}{2}$ –1 in. . . . . 2. *C. Lyallii*.  
 Leaves 2, oblong. Scape stout. Lip undivided . . . . . 3. *C. ? bifolia*.

1. **C. minor**, *Hook. f. Fl. N. Z. i. 247. t. 56 B.* A small, very slender herb, 2–8 in. high, pilose with spreading hairs. Leaf very narrow, linear, at the very base of the stem. Flower 1, rarely 2, pink,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam. Sepals linear, obtuse, narrower than the petals. Lip broad, 3-lobed; lateral lobes broad, banded with purple; middle subulate, glandular at the margin; disk with 2 series of stipitate glands.

**Northern** Island: dry clay hills, abundant. **Middle** Island: Otago, *Lyall*.

2. **C. Lyallii**, *Hook. f. Fl. N. Z. i. 247.* Much stouter than *C. minor*, with longer spreading hairs, 4–8 in. high. Leaf narrow linear, sometimes  $\frac{1}{4}$  in. broad. Scape stout, curved, 1–2-flowered. Flowers  $\frac{1}{2}$ –1 in. diam. Sepals obovate-oblong, acute or obtuse and apiculate; upper shorter, arched. Petals narrower. Middle lobe of lip subulate, recurved. Other characters as in *C. minor*.

**Middle** Island: Gordon's Nob, *Munro*; swampy places, Hurumui mountains, Lake Tennyson, and Mount Brewster, alt. 4–5000 ft., *Haast, Travers*; Otago, grassy places, *Lyall*. **Lord Auckland's** group, immature, *J. D. H.* Very closely allied indeed to the Tasmanian *C. carnea*.

3. **C. (?) bifolia**, *Hook. f. Fl. N. Z. i. 247.* Glandular-pubescent, 3–5 in. high, rather stout. Leaves 2, radical, oblong, spreading,  $\frac{3}{4}$ –1 $\frac{1}{4}$  in. long, pubescent or ciliated. Scape stout, 1-flowered, ebracteate. Flower erect,  $\frac{3}{4}$ –1 in. broad. Sepals obtuse; upper linear-oblong, obtuse, suberect; lateral and petals linear, nearly equal. Lip broad, almost sessile, orbicular-obovate, membranous, quite entire, with 2 short narrow lines of glands near the base.

**Northern** Island, *Colenso*. **Middle** Island: Lake Tennyson, alt. 4400 ft., *Travers*; Mount Brewster, alt. 4–5000 ft., *Haast*; grassy hills, Otago, *Lyall*. **Lord Auckland's**

group, *J. D. H.* A singular plant, differing from *Caladenia* in several respects, but hardly generically.

## 12. PTEROSTYLIS, Br.

Usually slender, leafy, erect, simple, rather succulent, glabrous herbs. Roots of small tubers terminating underground caulicles. Leaves radical or cauline, sheathing at the base. Flowers 1 in the N. Zealand species, membranous, green.—Perianth closed or open. Upper sepal and petals combined or conniving and forming a very concave boat-shaped hood; lateral sepals connate, ascending or deflexed. Lip small, clawed, its tip exerted between the free tips of the lateral sepals, or wholly exposed, often irritable, furnished with an erect or curved appendage at the base. Column slender, curved, broadly winged above. Anther terminal, persistent. Pollen-masses 4.

A large temperate Australian, Tasmanian, and New Zealand genus, not found elsewhere.

### A. *Lateral sepals erect. Lip glabrous, included, or the tip only exerted.*

*Leaves all cauline, or cauline and radical, all similar or nearly so.*

- |  |                          |
|--|--------------------------|
| Flower 2-3 in. long. Leaves all linear, grass-like . . . . .                     | 1. <i>P. Banksii</i> .   |
| Like <i>P. Banksii</i> , but smaller. Flower $\frac{3}{4}$ -1 in. long . . . . . | 2. <i>P. graminea</i> .  |
| Lower leaves oblong. Flower 1 in. long . . . . .                                 | 3. <i>P. micromega</i> . |

*Radical leaves broad, cauline reduced to bracts.*

- |  |                            |
|--|----------------------------|
| Glabrous. Leaves oblong. Bracts large, sheathing . . . . . | 4. <i>P. foliata</i> .     |
| Glabrous. Leaves long-petioled, ovate-cordate . . . . .    | 5. <i>P. trullifolia</i> . |
| Puberulous. Leaves short-petioled, ovate-cordate . . . . . | 6. <i>P. puberula</i> .    |

### B. *Lateral sepals deflexed. Lip filiform, plumose, exerted* . . . . . 7. *P. squamata*.

1. ***P. Banksii*, Brown;—***Fl. N. Z.* i. 248. Tall, leafy, 6-18 in. high. Leaves numerous, alternate, sheathing the whole stem, rising above the flower, narrow linear-lanceolate, acuminate. Flower solitary, 2-3 in. long. Upper sepal arched forwards, and lateral produced into long slender tails. Lip linear, glabrous, its tip exerted; appendage linear, curved, villous at the tip.—*Bot. Mag.* t. 3172.

Var.  $\beta$ . Leaves broader,  $\frac{1}{2}$ - $\frac{3}{4}$  in. Sepals less produced into long tails. *P. australis*, Hook. f. *Fl. N. Z.* i. 248.

Abundant throughout the **Northern** and **Middle** Islands to Otago, *Banks* and *Solander*, etc. Var.  $\beta$ , **Middle** and **Southern** Islands: Port William and Thomson's Sound, *Lyall*.

2. ***P. graminea*, Hook. f. *Fl. N. Z.* i. 248.** Slender, leafy, 6-10 in. high. Leaves sheathing, narrow linear-lanceolate, 1-3 in. long. Flowers solitary,  $\frac{3}{4}$ -1 in. long, of the same form as *P. Banksii*, but much smaller, and the sepals less produced into slender tails.

**Northern** and **Middle** Islands, not uncommon: east coast, *Colenso*; Auckland, *Sinclair*; Otago, *Lyall*. Probably only a small state of *P. Banksii*, but approaching the Australian *P. præcor*.

3. ***P. micromega*, Hook. f. *Fl. N. Z.* i. 248.** Slender, 3-8 in. high, leafy. Lower leaves large, ovate-oblong or lanceolate, obtuse or acute, sessile or petioled,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long; cauline smaller, more acuminate,  $\frac{1}{2}$ - $\frac{3}{4}$  in. Flower solitary, suberect, 1 in. long. Upper sepal narrow, slightly arched, caudate-acuminate; lateral erect, with narrow slender points. Petals narrow, acuminate. Lip glabrous, its tip exerted; appendage villous.

**Northern** Island, *Edgerley*; east coast, and bogs near Wairarapa, *Colenso*;  $\frac{1}{2}$  *Coromandel* gold-fields, *Jolliffe*. Approaching the Australian *P. cucullatu*, but smaller.

4. ***P. foliata*, Hook. f. *Fl. N. Z.* i. 249.** Rather stout, scapigerous,



2-10 in. high, quite glabrous. Leaves: radical petioled, oblong or elliptic-oblong,  $1-2\frac{1}{2}$  in. long, obtuse; cauline reduced to 1 or 2 large, erect, sheathing bracts,  $\frac{3}{4}-1\frac{1}{4}$  in. long. Flower solitary, erect,  $\frac{1}{2}-\frac{2}{3}$  in. long. Upper sepal much curved towards the tip, acuminate; lateral erect, their points filiform, exceeding the upper. Petals as long as the upper sepal, obtuse or subacute. Lip glabrous, its tip a little exserted; tip of appendage villous.

**Northern** Island: east coast, bogs near Oroí; hillsides, Cape Palliser; Wairarapa valleys; and tops of the Ruahiue mountains, *Colenso*.

5. **P. trullifolia**, *Hook. f. Fl. N. Z. i.* 249. Small, slender, glabrous, 2-5 in. high. Leaves radical, or towards the base of the scape, petioled, broadly ovate or orbicular-cordate or trowel-shaped, obtuse or acute,  $\frac{1}{4}-\frac{1}{3}$  in. long; petiole slender. Bracts 3-5, spreading, lanceolate, acuminate, the lower sometimes petioled. Flower solitary, erect,  $\frac{1}{3}$  in. long. Upper sepal abruptly arched forward beyond the middle, acuminate; lateral erect, their points filiform, longer than the upper. Petals narrow, acuminate. Lip glabrous, its tip shortly exserted; tip of appendage villous.

**Northern** Island: Bay of Islands, *Edgerley*, *Colenso*, etc.

6. **P. puberula**, *Hook. f. Fl. N. Z. i.* 249. Small, slender, puberulous, especially below, 3-5 in. high. Leaves radical, crowded, small, short, shortly petioled,  $\frac{1}{4}-\frac{1}{2}$  in. long, ovate-cordate, acute. Bracts numerous, erect, sheathing, lanceolate, acuminate. Flower erect, solitary,  $\frac{1}{2}-\frac{3}{4}$  in. long. Upper sepal slightly arched, acute; lateral erect, thin; points filiform, as long as or exceeding the upper. Petals broad, as long as the upper sepal, tips broad, obtuse or truncate. Lip with the tip exserted; tip of appendage divided.

**Northern** Island, *Colenso*; Auckland, *Sinclair*. Very closely allied to the Tasmanian *P. nana*.

7. **P. squamata**, *Brown;—Fl. N. Z. i.* 249. Stout, glabrous, erect, 3-8 in. high. Leaves radical, crowded, sessile, erect,  $\frac{1}{5}$  in. long, ovate-lanceolate, acuminate; bracts 3-4, sheathing, acuminate. Flower solitary,  $\frac{3}{4}-1$  in. long. Upper sepal slightly arched, acuminate; lateral deflexed, their tips linear, straight. Petals linear-subulate. Lip filiform, exserted, pendulous, plumose with long golden hairs, terminated by a large purple gland; appendage curved, villous at the tip. Wings of column each with a long erect tooth.

**Northern** Island: Auckland, *Sinclair*. Also a native of Tasmania and east and west temperate Australia.

### 13. CHILOGLOTTIS, Br.

Erect, rather stout, scapigerous, small herbs. Roots of small tubers at the end of underground caulicles. Leaves 2, at the base of the stem. Scape with 1 bract and 1 flower. Flowers suberect, lurid purple; peduncle lengthening after flowering.—Perianth 2-lipped. Upper sepal arched; lateral placed under the lip. Petals ascending or reflexed. Lip with a claw, with large glands or protuberances at the base and on the disk. Column long, 2-fid at the tip. Anther terminal, persistent. Pollen-masses 4.

A small south-east Australian and Tasmanian genus, with one Auckland Island species.

1. **C. cornuta**, *Hook. f. Fl. Antarct. i.* 69. A small herb, 2-4 in. high. Leaves  $1-1\frac{1}{2}$  in. long, linear-oblong, acute; veins reticulate. Scape

stout, lengthening much after flowering. Flower  $\frac{1}{2}$  in. diam. Upper sepal ovate-lanceolate, acuminate; lateral linear. Petals erect, short, ovate, acuminate. Lip trowel-shaped, shortly clawed, acuminate, with a horn-like projection at the base of the disk, one broader protuberance on each side of it, and 3 broad, flat tumid purple glands on the surface.

**Lord Auckland's** group, *Bolton*. **Campbell's** Island: mossy shady places, *Lyall*.

#### 14. *LYPERANTHUS*, Br.

Erect, rather stout, leafy, glabrous, terrestrial herbs. Root tuberous. Leaves sheathing at the base; bracts large. Flowers spiked or racemed, lurid, rather fleshy.—Upper sepal large, arched, concave, boat-shaped; lateral small, deflexed. Petals similar to the lateral sepals, spreading or reflexed. Lip small, sessile, ascending, entire, oblong; disk with small ridges or glands. Column short; anther erect, persistent. Pollen-masses 4, granular.

A small Australian, Tasmanian, New Caledonian, and New Zealand genus.

1. ***L. antarcticus***, *Hook. f. Fl. Antarct.* ii. 544. A span high, stout. Leaves 1–3, linear-oblong or oblong-lanceolate, 1–2 in. long, upper smaller. Flowers 2 or 3; bracts large, cucullate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Perianth horizontal,  $\frac{1}{3}$  in. long. Upper sepal very deeply arched, helmet-like, acute; lateral and petals linear-subulate, falcate, acute. Lip broad, ovate-oblong, obtuse, with 5 slender ridges on the disk. Column rather slender, arched.

**Middle** Island: open land, Waipori Creek, alt. 2500 ft., *Hector and Buchanan*. **Lord Auckland's** Islands, *Le Guillon, Bolton*.

#### 15. *THELYMITRA*, Forst.

Erect, stout or slender, scapigerous, glabrous herbs. Roots of ovoid tubers. Stem with a membranous sheath below the leaf. Leaves 1 or rarely 2, narrow, much elongated, thick and coriaceous. Flowers few, spiked or racemed.—Perianth spreading. Sepals and petals all oblong ovate or obovate, equal and nearly similar. Lip like the petals, but rather smaller. Column hooded, 3-fid; lateral lobes (staminodia) erect or prominent, crenate or produced into feathery appendages; middle small, entire, notched or 3-fid. Anther posticous, almost hidden between the lateral lobes of the column, attached to the middle one, persistent. Pollen-masses 4, fixed to the gland of the stigma, powdery.

A large Australian and Tasmanian genus, also found in New Zealand and the lofty mountains of Java. The species are most difficult of discrimination in a fresh state and impossible in a dried one; and the following all require revision. The only good characters I have been able to find are in the length and direction of the lateral lobes of the column.

*Flowers blue or purple.*

Column much longer than its short plumose appendages . . . . .	1. <i>T. longifolia</i> .
Column longer than its erect toothed appendages . . . . .	2. <i>T. pulchella</i> .
Column as long as its erect 2-toothed appendages . . . . .	3. <i>T. uniflora</i> .

*Flowers yellowish, few, 1–3. Stems slender.*

Column much shorter than its erect plumose appendages . . . . .	4. <i>T. Colensoi</i> .
Column as long as its crenate or fimbriate appendages . . . . .	5. <i>T. imberbis</i> .

1. ***T. longifolia***, *Forst. Char. Gen.*—*T. Forsteri*, Swartz;—*Fl. N. Z.* i. 243. Stout or slender, 8–16 in. high. Leaf variable,  $\frac{1}{8}$ –1 in. broad, linear, very narrow and channelled or long linear-lanceolate, nerved and flat, coria-

ceous. Spike 2-10-flowered. Flowers excessively variable in size; sepals blue or purple,  $\frac{1}{4}$ - $\frac{3}{4}$  in. diam.; petals paler; both ovate-lanceolate, acute. Lip obovate. Column with rounded tip, the appendages excessively short, villous anteriorly.—*T. stenopetala*, Hook. f. Fl. Antarct. i. 69; *Serapias regularis*, Forst. Prodr.

Abundant throughout the **Northern** and **Middle** islands, *Banks and Solander*, etc. **Lord Auckland's** Island, *J. D. H., Bolton*. A most variable plant in stature and robustness, the length and breadth of the bracts and leaves, and the number and size of the flowers. Apparently identical with the Tasmanian and Australian *T. nuda*, Br.

2. **T. pulchella**, *Hook. f. Fl. N. Z. i. 244*. A very handsome species, differing from *T. longifolia* in the usually broader sepals and petals, and the longer, erect, toothed appendages of the column. Flowers  $\frac{3}{4}$ -1 in. diam., fine blue-purple.

**Northern** Island, *Colenso*. **Middle** Island: Moure hills, *Munro*; Otago, *Lyall*. Probably a state of *T. Forsteri*.

3. **T. uniflora**, *Hook. f. Fl. N. Z. i. 70*. Short, stout, 6-8 in. high. Leaf narrow-linear, fleshy, obtuse, channelled, curved, shorter than the scape. Flowers 1-3, pale blue,  $\frac{1}{3}$ - $\frac{1}{2}$  in. diam. Sepals and petals linear-oblong, acute or acuminate. Lip obovate-cuneate. Appendages of column erect, linear, 2-fid at the tip.

**Middle** Island: Milford Sound, *Lyall*. **Lord Auckland's** group, *Le Guillon*, etc.

4. **T. Colensoi**, *Hook. f.—T. pauciflora*, Fl. N. Z. i. 244, not Br. Very slender, 8-12 in. high. Leaf very narrow linear, flexuous. Flowers 1-3, yellowish, on slender pedicels,  $\frac{1}{3}$  in. broad. Sepals and petals very narrow, linear-oblong, acute. Column very short; appendages very long, subulate, erect, plumose at the tip. Anther with a long point.

**Northern** Island, *Colenso*. This differs from all the other species, and from the Australian *T. pauciflora*, to which I had united it, in the very narrow sepals and petals, very short column, and very long erect appendages.

5. **T. imberbis**, *Hook. f. Fl. N. Z. i. 244*. Small, slender, 4-10 in. high. Leaf very narrow linear. Flowers 1 or 2, yellowish, about  $\frac{1}{2}$  in. diam. Sepals and petals very broad, orbicular-ovate, obtuse. Column rather short; appendages curving upwards and forwards, with crenate fimbriate or slightly villous tips. Anther with a long broad point.

**Northern** Island, *Colenso*. Much better specimens of this and the preceding are wanted to establish their distinctness; this is very like the Tasmanian *T. carnea*, but the flowers are said to be yellow.

## 16. SPIRANTHES, Richard.

Terrestrial, erect, glabrous or puberulous herbs. Root of unbranched fibres or much divided tubers. Stem simple, leafy. Flowers spiked or racemed.—Perianth nearly closed. Lateral sepals usually saccate at the base; upper ascending. Petals similar but narrower. Lip inferior, shortly clawed, quite entire, concave, embracing the column at its base. Column short, without lateral appendages. Anther at the back of the column, persistent,

stipitate. Pollen-masses 2, narrow, pyriform, powdery, fixed to the 2-fid rostellum above the stigma.

A considerable genus, found in various parts of the world.

1. **S. australis**, *Lindl.*;—*S. novæ-Zelandiæ*, *Hook.* *Fl. N. Z.* i. 242. A span high and upwards. Leaves 2 in. long, linear-lanceolate, acuminate, narrowed into long petioles. Scape covered with loosely sheathing bracts. Spike spiral, 1–2 in. long. Flowers  $\frac{1}{2}$ – $\frac{1}{5}$  in. long, white; bracts ovate, acuminate, as long as the flowers. Sepals and petals narrow, ovate-oblong, obtuse. Lip oblong, disk thickened; margins crumpled and waved. Ovary glandular-pubescent.

**Northern** Island, *Colenso*. The lip is very variable in form, narrower in the New Zealand than Australian specimens. A very common Australian plant, also found in China, India, and Siberia, and perhaps not different from a European species. The lip of the New Zealand plant indeed quite agrees with that of the European *S. æstivalis*.

### 17. PRASOPHYLLUM, Br.

Terrestrial, glabrous herbs; roots of round tubers often coated with matted fibres. Stem with a membranous sheath below the leaf. Leaf solitary, radical, linear, fistular, rarely short or 0. Flowers small, spiked, with the lip above.—Sepals oblong or ovate, lateral free or combined, recurved. Petals nearly as large as sepals, unequal-sided. Lip superior, clawed, ascending, undivided, often with an adnate plate on the disk. Column erect, small, with lateral appendages (staminodia). Anther at the back of the column, persistent, obtuse or with a long mucro. Pollen-masses 2, powdery, fixed to the rostellum above the stigma.

A large Australian and Tasmanian genus, more rare in New Zealand. I have very insufficient specimens of all the species except *P. Colensoi*.

Leaf sheathing the scape halfway up. Perianth  $\frac{1}{4}$  in. . . . . 1. *P. Colensoi*.

Leaf sheathing the scape to the top; blade very short or 0.

Perianth pointing forwards . . . . . 2. *P. nudum*.

Perianth pointing downwards . . . . . 3. *P. pumilum*.

1. **P. Colensoi**, *Hook. f. Fl. N. Z.* i. 241. Stout, erect, 4–10 in. high. Leaf exceeding the spike, its sheath seldom rising more than halfway up the scape. Spike 1–3 in. long, many-flowered; bract small, obtuse. Perianth horizontal, greenish yellow,  $\frac{1}{4}$  in. diam., sweet-scented. Sepals ovate-oblong, acuminate, lateral free. Petals linear-oblong. Lip trowel-shaped, claw short, blade fleshy, subacute, thickened towards the tip. Column extremely short; staminodia broadly notched. Ovary obovoid, tumid.—*Fl. Tasman.* ii. 12. t. 112 A.

**Northern and Middle** Islands: abundant from Auckland southwards to Otago. I suspect that this is a variety of the sweet-scented Tasmanian *P. alpinum*, but the lip is shorter, more coriaceous, and thicker towards the tip.

2. **P. nudum**, *Hook. f.*;—*P. tunicatum*, *Fl. N. Z.* i. 242. Very slender, 8 in. high. Stem and leaf coated below with a fibrous lacerated sheath. Scape included throughout its length in the slender leaf-sheath. Blade of leaf very short,  $\frac{1}{2}$  in. long. Spikes  $\frac{3}{4}$ –1 in. long; bracts minute, obtuse. Perianth horizontal, yellowish,  $\frac{1}{2}$  in. long. Lateral sepals free, ovate-lanceolate, acuminate. Petals much smaller, same shape. Lip ovate-



lanceolate, with a flat, glandular, adnate plate; claw long. Column short; lateral lobes broad, acuminate, deeply 2- or 3-toothed. Anther apiculate. Ovary linear.

**Northern** Island: east coast, clay hills, Te Hawara, Port Nicholson, and Lake Taupo, *Colenso*. I have only three specimens. This entirely agrees with my Hobarton (Tasmanian) specimens described in 'Flora Tasmaniae,' ii. 13, as *P. nudiscapum*, to which the name *nudum* should be transferred. The *P. nudum* of the same work (p. 14), differs according to Archer's specimens only in the rather longer teeth of the appendages of the column; but according to his figure (t. 113 C) in the more oblong, shorter, obtuse lip, with ciliate edges.

3. **P. pumilum**, *Hook. f. Fl. N. Z. i. 242*. Habit and leaf of *P. nudum*, but perianth bent downwards. Lateral sepals ovate, acuminate. Petals similar but smaller. Lip trowel-shaped, subacute, with a broad, glandular, adnate plate; claw rather long. Column short; its lateral lobes large, broad, obliquely truncate and toothed. Anther apiculate.

**Northern** Island, *Edgerley*; Auckland, *Sinclair*. Very similar to the Tasmanian *P. despectans*, H. f., if not a variety of it; but the perianth is shorter, its segments broader in proportion, and the lateral lobes of the column shorter.

## 18. ORTHOCERAS, Br.

Erect, glabrous, leafy, terrestrial herbs. Root of oblong tubers. Leaves narrow, filiform. Flowers rather large, racemed. Perianth closed.—Upper sepal suberect, hooded, fleshy, obtuse; lateral much longer, very narrow, almost filiform, quite erect. Petals minute, linear, 2-toothed at the tip. Lip inferior, small, 3-lobed, with small glands at its base, very shortly clawed. Column very short; lateral lobes subulate. Anther large, erect, persistent. Pollen-mosses 2, powdery, attached to the rostellum above the stigma.

A genus of an Australian and a New Zealand species.

1. **O. Solandri**, *Lindl.;—Fl. N. Z. i. 243*. Stout, erect, 1–2 ft. high. Leaves filiform, with long sheathing bases, rarely linear. Raceme 1–6 in. long, many-flowered; bracts large, spathaceous, exceeding the ovary. Perianth  $\frac{1}{3}$  in. long, greenish-yellow. Lateral sepals  $\frac{1}{2}$  in. long.—*O. strictum*, A. Cunn. not Br.; *Diuris novæ-Zelandiæ*, A. Rich. Flor. 163. t. 25. f. 1.

**Northern** Island: abundant on clay-bills, etc., *Banks and Solander*, etc. **Middle** Island: Nelson, ascending to 4000 ft., *Bidwill*. Very near indeed to the Australian *O. strictum*.

## ORDER II. IRIDEÆ.

Herbs with tuberous bulbous or creeping roots or rhizomes. Leaves mostly radical, alternately sheathing on opposite sides of the stem, linear, laterally flattened. Flowers usually large, racemed spiked or paniced, hermaphrodite.—Perianth superior, of 6 petaloid leaflets. Stamens 3, inserted at the base of the segments; anthers opening outwards. Ovary inferior, 3-celled; style simple, stigmas 3, various; ovules numerous. Capsule loculicidal, 3-valved. Seeds albuminous; embryo small.

A very large Order, especially in Europe and South Africa, less frequent elsewhere.

1. **LIBERTIA**, Sprengel.

Herbs. Flowers in subumbellate panicles.—Perianth spreading. Sepals linear-oblong, white or greenish. Petals larger, obovate, white. Stamens with filaments connate, or closely applied to the base of the style; anthers ovate, versatile. Stigmas filiform. Capsule obovoid or globose, coriaceous or membranous. Seeds angled and deeply pitted in the New Zealand species.

A small genus, also found in Australia, Tasmania, and Chili. The New Zealand species are very variable; perhaps two are confounded under *L. ixioides*, or perhaps it and *grandiflora* are but forms of one.

Leaves  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad. Umbels paniced. Capsule  $\frac{1}{4}$ – $\frac{1}{2}$  in. . . . . 1. *L. ixioides*.  
 Leaves  $\frac{1}{3}$  in. broad. Umbels paniced. Capsule  $\frac{1}{3}$ – $\frac{2}{3}$  in. . . . . 2. *L. grandiflora*.  
 Leaves  $\frac{1}{10}$ – $\frac{1}{10}$  in. broad. Umbels solitary. Capsule globose . . . . . 3. *L. micrantha*.

1. ***L. ixioides*, Sprengel**;—*Fl. N. Z.* i. 252. Variable in size, from 6 in. to 2 ft. Leaves rigid, narrow linear, acuminate,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad. Scape paniced above; branches alternate, arising from membranous spathes, bearing 2–10-flowered umbels; pedicels 1–2 in. long, with membranous bracts. Perianth white, 1 in. diam. or less; sepals oblong; petals much larger. Capsule  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, yellow or brownish, oblong or narrow pyriform.—*Reichenbach*, Ic. Exot. t. 157.

Var. *α*. Bracts all lanceolate. Capsule narrow, pyriform.

Var. *β*. Upper bracts ovate, acute. Capsule oblong.

Common throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. Var. *β*. Canterbury, *Lyall, Travers*. Klatt ('*Linnaea*,' 31, 383) distinguishes this (erroneously called *vestioides*) by the margins of the leaves being scabrid, but in all my specimens of both varieties they are quite smooth, or scarcely perceptibly rough.

2. ***L. grandiflora*, Sweet**. Stout, 2–3 ft. high. Leaves  $\frac{1}{3}$  in. broad. Scapes paniced above, branches alternate, sheaths, etc. as in *L. ixioides*, but petals usually larger in proportion to the sepals, and capsule very much larger,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, very turgid, broadly obovoid.—*L. macrocarpa*, Klatt, *Linnaea*, 31. 385; *Renalmia grandiflora*, Br.

**Northern** Island, *Banks and Solander*; Auckland, *Herb. Sinclair*. **Middle** Island: Port Cooper, *Lyall*. In the *Fl. N. Z.* I erroneously regarded this as a variety of *L. ixioides*.

3. ***L. micrantha*, A. Cunn.**;—*Fl. N. Z.* i. 252. Much smaller than the above, 4–6 in. high. Leaves rather membranous,  $\frac{1}{16}$ – $\frac{1}{10}$  in. wide. Scape as long as the leaves, pubescent above, bearing a solitary 3–8-flowered umbel. Perianth  $\frac{1}{3}$ – $\frac{1}{2}$  in. diam., its leaflets nearly equal; pedicels pubescent, surrounded by a many-leaved involucre. Capsule globose, membranous.

**Northern** and **Middle** Islands: common in damp, especially mountain woods, *Banks and Solander*, etc., ascending to 4000 ft. in the Nelson mountains.

ORDER III. **HYPOXIDEÆ**.

Herbs, usually perennial, with tuberous, bulbous, or tufted roots. Leaves parallel-veined, mostly all radical. Inflorescence various. Flowers hermaphrodite.—Perianth superior, of 6 equal leaflets. Stamens 6; anthers opening inwards. Ovary inferior, 3-celled; style simple, stigmas usually 3;

ovules numerous. Fruit a capsule or berry. Seeds with copious albumen and nearly straight embryo.

A large, chiefly subtropical family, most abundant in South Africa.

### 1. HYPOXIS, Linn.

Small herbs. Root bulbous or tuberous, covered with matted fibres. Leaves all radical, enclosed in a membranous sheath at the base. Scapes 1- or many-flowered. Flowers yellow.—Perianth leaflets nearly equal, yellow. Stamens 3; anthers erect. Stigmas 3. Capsule 3-celled. Seeds with a short beak at the hilum.

A large South African genus, also found in India, Australia, and America.

1. **H. pusilla**, Hook. f. *Fl. Tasman.* ii. 36. t. 130 B;—*H. hygrometrica*, Br. ? *Fl. N. Z.* i. 253. Very small, 1–2 in. high. Leaves narrow linear, nearly glabrous. Scape shorter than the leaves, 1-flowered. Perianth glabrous,  $\frac{1}{8}$  in. diam.; leaflets ovate-lanceolate. Ovary obovate, narrowed below.

**Northern** Island: east coast, Ahuriri, Te Hautotara, etc., *Colenso*. **Middle** Island, Banks's Peninsula, *Travers*. Also found in Tasmania.

## ORDER IV. PANDANÆÆ.

Erect or climbing shrubs or trees, rarely stemless, often branched. Leaves usually long, narrow, and spinous-serrate. Spikes or heads often clustered, peduncled.—Flowers unisexual. Perianth 0, or rarely of 3 or 4 valvate leaflets. *Male* fl.: stamens numerous; filaments filiform; anthers inserted by their base, linear, 2–4-celled. *Female* fl.: ovaries 1-celled, usually numerous and variously connate; stigma sessile; ovules solitary or numerous, on parietal placentas. Fruit a drupe or berry. Seeds oblong; albumen fleshy or horny; embryo minute.

A rather large, tropical Order, containing many arborescent species.

### 1. FREYCINETIA, Gaudiehaud.

Climbing shrubs, branched, leafy at the ends of the branches. Leaves sheathing at the base, narrow linear-subulate, margins prickly. Spikes fasciated, terminal, surrounded by bracts at the base of the peduncles. *Male* fl.: bundles of stamens surrounding a rudimentary ovary. *Female* fl.: several ovaries, variously combined, surrounded by imperfect stamens. Seeds numerous.

An Asiatic tropical genus of no great extent.

1. **F. Banksii**, A. Cunn.;—*Fl. N. Z.* i. 237. t. 54 and 55. A lofty climber. Leaves 2 ft. long, serrulate, concave, tip 3-gonous. Spikes cylindrical, 3–4 in. long, surrounded by white, fleshy bracts. Anthers 2-celled. Fruit an oblong, green spadix, consisting of a multitude of laterally compressed carpels, about  $\frac{1}{2}$  in. long, clavate, truncate; the lower part soft, hollow, the walls of its cavity densely covered with pendulous seeds; upper part thickened, very hard, solid; the truncate tip crenate, the crenatures stigmatiferous. Seeds small, linear-oblong, with a cellular testa.

**Northern** Island: as far south as the east coast, *Banks and Solander*. The bracts and young spikes make a very sweet preserve; the leaves are used for basket-making.

### (AROIDEÆ.)

*CALADIUM esculentum*, Vent. (*Colocasia esculenta*, Schott; *Arum esculentum*, Linn.), is the Tarro or Tullo of the natives, introduced by them into the islands, and still abundantly cultivated (Forst. Pl. Esc. p. 58); it is a staple article of food in many parts of the Old World.

## ORDER V. TYPHACEÆ.

Erect, leafy, marsh or water-plants. Leaves linear, sessile, sheathing at the base. Flowers unisexual, rarely hermaphrodite, in dense heads or catkins. Perianth 0, or of irregular scales or hairs. Stamens densely crowded; filaments slender; anthers linear or ovoid, inserted by their bases. Carpels densely crowded, narrow, 1-celled, tapering into a slender style, with a narrow unilateral stigma; ovule solitary, pendulous. Fruit, small nuts or utricle. Seed pendulous; embryo straight, in copious albumen.

The following genera are the only ones known.

Flowers in long, dense, cottony, brown cylindric spikes . . . . . 1. *TYPHA*.  
Flowers in globular heads . . . . . 2. *SPARGANIUM*.

### 1. *TYPHA*, Linn.

Tall, erect, marsh or water herbs; rootstock stout, creeping. Leaves all radical, long, linear, thick, flat, sheathing at the base.—Flowers in 1 or 2 long, dense, cylindric, terminal superimposed catkins; upper, or upper part if one only, male, lower female. Stamens mixed with hairs. Ovaries very minute, narrow, surrounded by hairs, which are thickened upwards, and form a copious brown, cottony mass. Nuts minute, slender, on slender stalks.

A very common tropical and temperate genus, of very few species, called Reed-maces and often Bulrushes.

1. *T. angustifolia*, Linn.;—*Fl. N. Z.* i. 238. Leaves 2–3 ft. long,  $\frac{1}{3}$ – $\frac{1}{2}$  broad. Scapes 4–8 ft. high, terete, solid, bearing 2 cylindric, brown catkins at the top, of which the upper or terminal is male, the lower female.—*T. latifolia*, Forster, not Linn.

**Northern** Island: in marshes and river banks, *Forster*, etc. Common in all parts of the world, including the Pacific Islands, Norfolk Island, and Australia. I refer this to *T. angustifolia* because the catkins, male and female, are separated by an interval, but the stature is that of *T. latifolia*, and I find the position of the catkins to vary extremely in tropical specimens of both. They are doubtless varieties of one plant. The present is extensively used for making walls and roofs of houses. The pollen is made into loaves of bread by the natives, as in Scinde.

### 2. *SPARGANIUM*, Linn.

Roots fibrous. Stems erect, simple or branched. Leaves alternate, sheathing at the base, linear, grass-like, erect or floating. Flowering-branches terminal, simple or branched.—Flowers in sessile, globose, spiked or paniced heads, the lower with leafy bracts at their base. Upper heads male. Stamens mixed with minute scales. Lower heads larger, female. Ovaries sessile, each



surrounded by a perianth of 3-6, small linear scales. Nuts ovoid or ob-ovoid, thick.

A small aquatic genus, found in all temperate climates.

1. **S. simplex**, *Huds.*;—*Fl. N. Z.* i. 238. An erect, rather flaccid herb, 1-2 ft. high. Leaves a foot long,  $\frac{1}{2}$  in. broad, acute, channelled. Scape slender, erect, not branched. Nuts broadly obovoid,  $\frac{1}{8}$  in. long, suddenly contracted into a slender style.

**Northern** Island: in watery places frequent, *Bidwill*, etc. "Simple Bur-reed" of England. a common plant in various parts of the New and Old World, including Australia, but not found in Tasmania.

## ORDER VI. NAIADEÆ.

Floating, submerged, or erect marsh plants (in *Lemna* reduced to floating green scale-like fronds). Leaves alternate, linear or oblong, sheathing at the base. Stipules usually interpetiolar, membranous, sheathing. Inflorescence various, usually spiked.—Flowers minute, green, inconspicuous, unisexual or hermaphrodite. Perianth inferior, regular, of 4-6 green pieces in 2 series, or 0, or reduced to scales, or to a tubular sheath. Stamens 1, 4 or 6; filaments usually short; anthers 2- or 4-celled, inserted by their base, dehiscing longitudinally; pollen often of confervoid threads. Ovaries free, 1-6; styles short or long, stigmatiferous on the inner face; ovule 1, usually pendulous in each cell. Fruit of 1-6 indehiscent nuts, rarely drupes or capsules. Seed erect or pendulous, albumen 0; testa membranous; embryo with a very large radicle, usually curved or inflexed; plumule in a slit on one side of it.

An extensive family of water plants, scattered over the whole globe.

- |  |                  |
|--|------------------|
| Small scale-like floating fronds . . . . .   | 1. LEMNA.        |
| Simple or branched marsh or water plants. Leaves linear or oblong.                               |                  |
| Flowers spiked.  |                  |
| Perianth 6-leaved. Stamens 6; anthers subsessile . . . . .                                       | 2. TRIGLOCHIN.   |
| Perianth 4-leaved. Stamens 4; anthers subsessile . . . . .                                       | 3. POTAMOGETON.  |
| Perianth 0. Stamens 4; anthers sessile. Ovaries 4. Nuts on long stalks . . . . .                 | 4. RUPPIA.       |
| Flowers axillary. Male fl.: a long stamen. Female: 2-5 ovaries in a sheathing perianth . . . . . | 5. ZANNICHELLIA. |

### 1. LEMNA, Linn.

Minute green scale-like fronds, covering the surface of ponds and ditches. Roots thread-like, suspended from the frond. Flowers most minute, appearing by threes in a cleft of the frond, surrounded by a thin membranous spathe.—Two of the flowers are males and consist of a single stamen each, with slender filament and 2-celled anther; the other is a female, and is a 1-celled 1- or 2-ovuled ovary, with a funnel-shaped stigma. Fruit a most minute 1-4-seeded utricle. Seed erect or horizontal; testa ribbed, membranous; albumen 0; cotyledon thick, farinaceous, including the radicle and plumule.

A genus of few species, scattered over the globe, rarely found in flower. "Duckweed."

- |  |                      |
|--|----------------------|
| Frond oblong or oval, flat below . . . . .   | 1. <i>L. minor</i> . |
| Frond oblong or oval, convex below . . . . . | 2. <i>L. gibba</i> . |

1. ***L. minor***, *Linn.*;—*Fl. N. Z.* i. 239. Fronds ovate or oblong, green, about  $\frac{1}{12}$ — $\frac{1}{10}$  in. long, with a single capillary root. Flower not seen.

**Middle** Island: Port Cooper, *Lyall*. Probably abundant elsewhere (as throughout the world), but overlooked.

2. ***L. gibba***, *Linn.*;—*Fl. N. Z.* i. 239. Like *L. minor*, but frond convex below. Flower not seen.

**Northern** Island: east coast, *Colenso*. Also a common plant in various parts of the world, but not so frequent as *L. minor*. Some of the Tasmanian specimens referred to *L. minor* in *Fl. Tasm.* are referable to this. Fronds of New Zealand and Tasmanian specimens are of the same size as those of *L. minor*, and much smaller than of English specimens.

## 2. TRIGLOCHIN, *Linn.*

Marsh herbs. Leaves all radical, filiform or rush-like, sheathing at the base. Scape naked, slender, bearing a terminal spike or raceme of small green flowers.—Flowers hermaphrodite, green, small, ebracteate. Perianth of 6, green, concave pieces in 2 series. Stamens 6; filaments very short; anthers bursting outwards. Ovaries 3 or 6, partially cohering; stigma sessile; ovule solitary, erect. Fruit of 3 carpels (or more, the alternate not ripening), separating from a central axis. Embryo straight, radicle inferior.

A widely diffused, but not large genus, in the temperate zones of both hemispheres.

1. ***T. triandrum***, *Michaux*;—*Fl. N. Z.* i. 236. A very slender, glabrous herb, 3–10 in. high. Leaves filiform, grass-like, semiterete, as long as or longer than the scape. Flowers minute, green, pedicelled. Fruit globose, of 3 keeled carpels, alternating with as many or fewer imperfect ones. Stigmas recurved.—*T. flaccidum*, *A. Cunn.*; *T. filifolium*, *Hook.* *lc. Pl. t.* 579.

**Northern** and **Middle** Islands: common in marshes, especially near the sea, *Banks* and *Solander*, etc. Also found in Australia, South Africa, and temperate North and South America.

## 3. POTAMOGETON, *Linn.*

Aquatic plants. Stems creeping, jointed and rooting. Leaves 2-ranked, usually alternate, all similar, or the lower narrow submerged, the upper broader floating; stipules membranous, free or united and sheathing. Spikes on axillary peduncles.—Flowers hermaphrodite, green, small, ebracteate. Perianth of 4 concave pieces, valvate in bud. Stamens 4; filaments very short. Ovaries 4; stigmas sessile or subsessile; ovule solitary, ascending. Fruit of 4 small drupe-like nuts, often compressed. Embryo curved.

A large and very abundant genus in all parts of the world, the species of which are very variable. Much better specimens of the New Zealand species are wanted.

Floating leaves oblong or lanceolate-oblong . . . . .	1. <i>P. natans</i> .
Leaves, lower linear, grass-like, upper floating, oblong, lanceolate, acute . . . . .	2. <i>P. heterophyllus</i> .
Leaves all narrow linear and grass-like. Stipules free, lacerate . . . . .	3. <i>P. gramineus</i> .
Leaves all very narrow linear. Stipules united with leaf-margins . . . . .	4. <i>P. pectinatus</i> .

1. ***P. natans***, *Linn.*;—*Fl. N. Z.* i. 236. Stems and branches long or short according to the depth of the water. Leaves on long petioles, floating, 1–3 in. long, oblong, obtuse or acute, often subcordate at the base, reddish-brown; submerged (if present) linear; stipules not winged, without ribs. Scape

not thickened upwards. Nut when fresh obtuse at the back, or obscurely 3-ribbed.

**Northern** and **Middle** Islands: abundant in ponds, rivers, etc. A most common aquatic herb in Europe and elsewhere throughout the globe.

2. **P. heterophyllus**, *Schreber*? Lower submerged leaves narrow-linear, membranous, 3-4 in. long,  $\frac{1}{8}$ - $\frac{1}{4}$  in. broad, margins waved or rather crisped, upper submerged leaves broader, passing into the floating, which are petioled, 1-1 $\frac{1}{2}$  in. long, oblong, obtuse, coriaceous; stipules free.

**Middle** Island: Clethra river, Otago, *Lindsay*. Without flower or fruit; apparently the same as the Tasmanian plant, which is common in various temperate parts of the globe.

3. **P. gramineus**, *Linn.*?—*P. ockreatus*, Raoul, Choix, t. 7;—*Fl. N. Z.* i. 236, and ii. 336. Leaves all submerged, membranous, grassy, 1-3 in. long,  $\frac{1}{8}$ - $\frac{1}{4}$  in. broad, narrow-linear, 3-5-nerved; stipules free, lacerate. Peduncle very stout, 1 in. long. Spike oblong, continuous. Nuts compressed, obliquely broadly ovoid, with a mucronate style,  $\frac{1}{10}$  in. diam.

**Northern** and **Middle** Islands: Akaroa and Bay of Islands, *Raoul*, *Colenso*; Auckland, *Sinclair*. A very common European, Australian, and Tasmanian plant; also found in many other temperate countries. In the N. Z. Flora I referred this to *P. compressus*, *Linn.*, according to Fries' specimens: but Fries' plant is apparently not the true *compressus*, and considered by Prof. Oliver to be more probably a form of *pusillus*. My specimens from M. Raoul are ticketed as from the Bay of Islands, but in his 'Choix' he states it to be a native of Banks's Peninsula.

4. **P. pectinatus**, *Linn.* Leaves all submerged, membranous, grassy, very narrow-linear, 2-3 in. long,  $\frac{1}{20}$  in. broad; stipules united with the base of the leaf into an entire sheath. Peduncle very long, slender. Flowers in distant fascicles. Nuts gibbous, compressed, obliquely very broadly ovoid, with a very short style.

**Northern** Island: lagoon at Taungloio and Hawke's Bay, *Colenso*.

#### 4. RUPPIA, *Linn.*

A slender brackish-water plant. Stems extremely slender. Leaves filiform with sheathing bases. Flower-spikes first included in the leaf-sheaths, then lengthening, often twisted spirally, and ascending to the surface.—Flowers hermaphrodite, small, green, ebracteate, remote on a slender spadix, the stamens and pistils sometimes so wide apart that the flowers appear to be monœcious. Perianth 0. Stamens 4; anthers sessile, 1-celled, or 2 with separate anther-cells. Pollen a long curved cell. Carpels 4, sessile, with sessile stigmas and solitary suspended ovules. Fruit of 1-4 minute, long stipitate, obliquely ovoid, obtuse or pointed nuts. Embryo hooked.

An abundant plant in Europe and many parts of the world.

1. **R. maritima**, *Linn.*;—*Fl. N. Z.* i. 236.

**Northern** and **Middle** Islands: abundant in salt-water ditches, etc., as far south as Otago. A very frequent plant throughout the northern and southern hemispheres; abundant in Australia and Tasmania.

#### 5. ZANNICHELLIA, *Linn.*

Slender, fresh- or brackish-water herbs. Stems forked, capillary. Leaves

opposite or alternate, very slender, with sheathing membranous stipules.—Flowers unisexual, very minute, axillary, sessile, naked, usually in pairs (male and female). *Male*, a solitary stamen; filament very slender; anther 2–4-celled. *Female*, 2–5 carpels in a cup-shaped involucre; stigma peltate; ovule solitary, suspended. Fruit of usually 4 curved, stalked, narrow, beaked nuts. Embryo bent upon itself; cotyledon slender.

A genus of few species, scattered over the globe.

1. **Z. palustris**, *Linn.*;—*Fl. N. Z.* i. 237. A very slender aquatic, forming tangled masses in fresh or brackish water. Stems capillary, 3–12 in. long, branched. Leaves almost filiform, 2–3 in. long. Nuts shortly stalked,  $\frac{1}{10}$  in. long, with filiform styles as long as themselves.

**Northern** Island: east coast, *Colenso*, in fresh water. Abundant in Europe and Australia, and generally in temperate as well as tropical countries.

Some other both fresh and salt-water plants of this Order may be found in New Zealand, as *Cymodocea* and *Posidonia*, both marine, and common in Australia.

## ORDER VII. LILIACEÆ.

(Including SMILACEÆ, ASPHODELEÆ, and ASTELIÆ.)

Herbs, rarely shrubs or trees, of very various habit, sometimes (*Rhipogonum*) climbing.—Flowers usually hermaphrodite and regular. Perianth inferior, of 6 coloured leaflets in 2 series, free or combined into a tube. Stamens 6, attached to the perianth or free from it; anthers bursting inwards, attached by a point. Ovary superior, 3-celled (1-celled in some *Astelie*); style simple, stigma 3-lobed; ovules 2 or more (rarely 1) in each cell. Fruit a membranous or coriaceous, 3-celled, loculicidally 3-valved capsule, or an indehiscent 1–3-celled berry. Seeds few or numerous, globose or flattened; testa crustaceous or membranous; albumen horny; embryo terete, straight or curved.

A very large Order, found in all parts of the world but the coldest.

A. *Fruit a berry. Seeds turgid; testa membranous. Leaf-veins netted* (Smilacæ).

Climbing shrub. Ovary-cells 1-ovuled . . . . .	1. RHIPOGONUM.
Small herb. Ovary-cells few-ovuled . . . . .	2. CALLIXENÆ.

B. *Fruit a berry. Seeds globose or oblong; testa crustaceous.*

Glabrous. Stem often arboreous. Filaments subulate . . . . .	3. CORDYLINÆ.
Glabrous herbs. Filaments curved, thickened upwards . . . . .	4. DIANELLA.
Herbs with villous silky or chaffy leaves. Flowers diœcious . . . . .	5. ASTELIA.

C. *Fruit a 3-celled, many-seeded capsule. Seeds flattened or angular; testa usually black.*

Flowers white, paniced, spreading; pedicels jointed in middle . . . . .	6. ARTHROPODIUM.
Flowers racemed, yellow, spreading; pedicels not jointed . . . . .	7. ANTHERICUM.
Flowers paniced, green and orange, tubular, irregular . . . . .	8. PHORMIUM.
Flowers solitary in spathes. Small herb . . . . .	9. HERPOLIRION.

### 1. RHIPOGONUM, Forst.

Climbing wiry shrubs. Leaves opposite and alternate, petioled, 3-nerved, with netted venation. Flowers in spreading axillary and terminal racemes, hermaphrodite.—Perianth of 6 minute spreading leaflets. Stamens larger



than the petals; filaments very short. Ovary 3-celled; style short; ovules 1 in each cell. Berry 1- or 2-seeded. Seeds hemispherical; testa membranous.

Only three species are known, the following and two Australian.

1. **R. scandens**, *Forst.*; —*Fl. N. Z.* i. 253. Stems very slender, knotted, forming interwoven wiry masses in the forest. Leaves 3-5 in. long, linear ovate or oblong, subacute, coriaceous. Racemes simple or branched, 1-2 in. long. Flowers  $\frac{1}{4}$  in. diam. Berry scarlet.—*R. parviflorum*, Br.; *Smilax Rhipogonum*, *Forst. Prodr.*

**Northern** and **Middle** Islands: abundant as far south as Otago, *Banks and Solander*, etc. The long underground rootstocks have been used as Sarsaparilla by settlers, and the stems as cord and for basket-work by the natives.

## 2. CALLIXENE, Commerson.

Matted glabrous herbs, with wiry branching creeping stems, knotted at the joints, with membranous scales at the joints. Leaves alternate, distichous, with netted veins.—Flowers solitary, nodding, hermaphrodite. Perianth of 6 white spreading leaflets, with 2 glands at the base of 3 or all. Ovary 3-celled; style stout, 3-grooved; ovules few in each cell. Berry few-seeded; seeds globose, with a membranous testa.

A genus of 2 species, one a native of Fuegia and S. Chili, the other of New Zealand.

1. **C. parviflora**, *Hook. f. Fl. N. Z.* i. 254. Stems wiry, 8-10 in. long. Leaves  $\frac{3}{4}$  in. long, with short twisted petioles, linear or oblong, acute or obtuse, 3-5-nerved. Flower  $\frac{3}{4}$  in. broad, peduncle usually terminal. Perianth segments ovate-lanceolate, acute. Filaments glabrous. Berry globose.—*Hook. Ic. Pl.* t. 632.

**Northern** Island: mountainous districts, *Colenso*. **Middle** Island: in damp forests, ascending to 4000 ft., common.

## 3. CORDYLINE, Commerson.

Trees or rarely stemless herbs. Leaves alternate, very long, with broad bases, distichous, or crowded at the ends of the trunk or branches, nerves obliquely leaving the midrib, parallel. Flowers white, on much branched panicles, hermaphrodite.—Perianth campanulate, of 6 nearly equal persistent leaflets, more or less combined at the base. Stamens inserted on the petals, filaments subulate, glabrous. Ovary 3-celled; style simple, stigma 3-lobed; ovules numerous in each cell. Berry globose, 3-celled, few- or many-seeded. Seeds angular; testa black, crustaceous. Pedicels 3-bracteate; first and third bracts 1-nerved, intermediate one with 2 nerves.

A large genus in the southern hemisphere, most frequent in New Zealand, Australia, and the Pacific Islands.

Trunk arborescous.

Leaves 2 ft. $\times$ $1\frac{1}{4}$ - $1\frac{1}{2}$ in., not petioled, striate. Bracts $\frac{1}{2}$ as long as flower	1. <i>C. australis</i> .
Leaves 5-6 ft. $\times$ $1\frac{1}{2}$ -2 in., long petioled, nerved. Bracts extremely short	2. <i>C. Banksii</i> .
Leaves 2-3 ft. $\times$ 4-5 in., very thick. Bracts almost as long as flower	3. <i>C. indivisa</i> .
Stem 0, or slender and very short. Leaves 1-2 ft $\times$ $\frac{1}{4}$ - $\frac{1}{2}$ in. . . . .	4. <i>C. Pumilio</i> .

1. **C. australis**, *Hook. f. Fl. N. Z.* i. 257; *Gard. Chron.* 1860, 792;

not Endlicher. Trunk arboreous, 10–40 ft. high, branched. Leaves ensiform, 2 ft. long,  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. broad, slightly contracted above the broad base, striated with numerous parallel veins, all equally fine, midrib obscure. Flowers densely crowded, white,  $\frac{1}{3}$  in. diam., sweet-scented; bracts from half as long to as long as the bud before expansion.—*Dracæna australis*, Forst. Prod. 151.

**Northern and Middle Islands**, *Banks and Solander*, etc, apparently common throughout. There are no specimens of this in the Banksian or Paris Herbariums from Forster himself, but his drawing identifies the plant; it is distinguished from *C. Banksii* by the shorter leaves not contracted at the base, without strong nerves, and by the large bracts. The *Dracæna australis* of Bot. Mag. has the short flowers of this species, but the minute bracts of the following, but differs from both in the much broader leaves. I find the same plant from Norfolk Island, whence I suspect Frazer procured it, and not from New Zealand.

2. **C. Banksii**, *Hook. f. in Gard. Chron.* 1860, 792. Trunk arboreous, 5–10 ft. high, simple or sparingly branched. Leaves very long, 5–6 ft. long by  $1\frac{1}{2}$ –2 in. broad, linear-lanceolate, gradually contracted into a petiole 1–2 ft. long, striated, and having 6 or 8 evident nerves on either side of the prominent midrib. Panicle lateral, drooping, 2–5 ft. long. Flowers white, longer than in *C. australis*,  $\frac{1}{2}$  in. long, nearly sessile. Bracts small, not  $\frac{1}{2}$  part as long as the flowers previous to expansion. Berry white.

**Northern and Middle Islands**: Port Nicholson and Ruahine mountains, *Colenso*; Canterbury, *Travers*, etc. There is a small specimen of this in the British Museum, collected by Banks and Solander, but not alluded to in their MSS. nor drawings; it differs from *C. australis* in the shorter trunk, much longer, narrower, petioled leaves, with evident strong veins, the minute bracts, and longer in the flowers, and (according to Colenso) in the drooping lateral panicle.

3. **C. indivisa**, *Kunth*;—*Fl. N. Z.* i. 258. Trunk simple, arboreous, 2–5 ft. high. Leaves excessively thick and coriaceous, 2–3 ft. long, 4–5 in. broad, scarcely contracted at the base, glaucous below; nerves numerous, yellowish, strong, midrib stout. Panicle very large, drooping. Flowers pedicelled,  $\frac{3}{4}$ –1 in. diam., most densely crowded, imbricate. Bracts nearly as long as the flower and pedicel.—*Dracæna indivisa*, Forst. Prod. n. 150; Plant. Esc. n. 33.

**Northern Island**: Ruahine range, *Colenso*. **Middle Island**: Thompson's Sound, *Lyall*; Dusky Bay, *Forster*. A magnificent plant, well distinguished by the broad, excessively thick leaves, glaucous below, and huge drooping panicle, covered with the large flowers. Flax from its leaves is used by the natives of the Northern Island to make a garment called Toi (Colenso).

4. **C. Pumilio**, *Hook. f. in Gard. Chron.* 1860, 792.—*C. stricta*, *Fl. N. Z.* i. 257. t. 58, not Endlicher. A small plant. Stem 0 or short, slender, not thicker than the thumb. Leaves 1–2 ft. long,  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad, linear, grass-like, nerves few, midrib stout, prominent. Panicle erect, very lax, 2 ft. long, branches spreading, slender. Flowers few, scattered, pedicelled, white,  $\frac{1}{3}$  in. diam.; bracts subulate, half as long as the flower and twice as long as the bracts.

Northern parts of the **Northern Island**: Bay of Islands, *A. Cunningham*. A very different-looking species from all the preceding. The *C. stricta* of Endlicher (*Dracæna stricta*, Bot. Mag. t. 2575; Bot. Reg. t. 965), is an arboreous species, with bluish flowers. The present was regarded by A. Cunningham as a young plant of *C. australis*.

4. **DIANELLA**, Lamarck.

Herbs with short tufted rhizomes. Leaves very long, linear, rigid, equitant or sheathing. Scapes bearing compound panicles. Flowers jointed on the rigid, curved pedicels, white or blue, drooping, hermaphrodite.—Perianth of 6 nearly equal, spreading, deciduous leaflets. Stamens 6; filaments incurved, thickened upward. Ovary 3-celled; style filiform, stigma simple; ovules numerous in each cell. Berry globose or oblong, many-seeded. Seeds globose, with metallic crustaceous testa.

A genus of no great number of species, natives of Madagascar, the South Sea Islands, India, Australia, and New Zealand.

1. **D. intermedia**, *Endl.*;—*Fl. N. Z.* i. 255. Rootstock woody, with underground runners. Leaves 1–5 ft. long, narrow linear-ensiform, rigid, rough on the edges. Panicle 10–18 in. long, much branched; peduncles and pedicels very slender, the latter curved. Flowers small, greenish-white, nodding,  $\frac{1}{3}$  in. diam. Anthers linear. Berry  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, dark blue.

**Northern** and **Middle** Islands: frequent in fern lands and in woods, *Banks* and *Solander*, etc. Also a native of Norfolk Island.

5. **ASTELIA**, Banks and Solander.

Large or small tufted herbs, usually more or less clothed with silky, shaggy, or chaffy hairs. Leaves all radical, long, narrowed from base to tip, sheathing the scape. Flowers numerous (rarely few) in branched racemes or panicles, white greenish or purplish, diœcious.—Perianth coloured, petaloid or rather dry in texture, campanulate or rotate, silky, 6-partite. Stamens 6. Ovary 3-gonous, 1 or 3-celled; style short or 0, stigma 3-lobed; ovules few or numerous, pendulous from the top of the cells, or attached to central or parietal placentas. Berry 1–3-celled, few- or many-seeded. Seeds oblong, angled or terete; testa black, brittle; albumen fleshy; embryo small.

A small genus, confined to the alps of Australia and Tasmania, New Zealand, the Pacific Islands, and Antarctic America. The New Zealand species are all diœcious, and, from growing usually on lofty forest trees, it is most difficult to match the sexes. I am not satisfied with the following determination of the species, which is that proposed in *Fl. N. Z.*, since the publication of which no one has attempted to clear up their limits, as there urgently desired.

*Perianth not enclosing the fruit. Berry 1-celled. Seeds terete.*

Leaves 2–5 ft., silky and shaggy. Berry globose . . . . . 1. *A. Cunninghamii*.  
Leaves 1–6 in., glabrous or scaly. Berry ovoid . . . . . 2. *A. linearis*.

*Perianth usually enclosing the ripe fruit. Berry 3-celled. Seeds angled.*

Leaves 1–3 ft.  $\times$   $\frac{1}{2}$ – $\frac{3}{4}$  in., strong, glabrous or silky; nerves 3 . . . 3. *A. nervosa*.  
Leaves 2–4 ft.  $\times$  3 in.; nerves 3. Filaments  $\frac{1}{2}$  in. long . . . 4. *A. Solandri*.  
Leaves 2–5 ft.  $\times$   $\frac{1}{3}$ – $\frac{2}{3}$  in.; nerves obscure. Perianth rotate. Filaments  
subulate . . . . . 5. *A. Banksii*.

1. **A. Cunninghamii**, *Hook. f. Fl. N. Z.* i. 259. A large, tufted, very silky herb. Leaves 2–5 ft. long, spreading and recurved,  $\frac{1}{2}$ –1 in. broad, plaited, silky and villous. *Male*: Scape 1–1 $\frac{1}{2}$  ft., angled, flexuose, shaggy, much and widely branched. Flowers numerous. Perianth rotate,  $\frac{1}{4}$  in. diam.; segments acuminate, red-brown when dry. *Female*: Scape 1 ft.; branches crowded, erect, 3–8 in. long. Perianth as in male. Ovary globose; style

short; ovules from the upper part of 3 parietal placentas, imbedded in mucilage. Berry globose. Seeds 6-8, linear, terete, curved; testa thick; in germination the embryo pushes before it a small black operculum.

**Northern** Island: common on limbs of forest-trees. **Middle** Island: Aorere valley, *Travers*. Very like *A. Banksii*, but differs in the larger flowers, ovary, fruit, and seeds.

2. ***A. linearis***, *Hook. f. Fl. Antarct.* i. 76;—*Fl. N. Z.* i. 260. A small tufted herb, glabrous or more or less covered with appressed chaffy hairs. Leaves spreading, 1-6 in. long, narrow linear, acuminate, keeled, margins recurved, silky and villous at the base. Scape few-flowered, shorter than the leaves. Berry elongate, obtusely 3-gonous, red. Seeds obovoid, shining, not angled.

**Northern** Island: swamps on the summit of the Ruahine mountains, *Colenso*. **Lord Auckland's** group and **Campbell's** Island: boggy ground on the bare hillsides, *J. D. H.*

3. ***A. nervosa***, *Banks and Solander*;—*Fl. N. Z.* i. 260. Densely tufted. Leaves 1-3 ft. long, narrow linear-subulate,  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad, silky or glabrous, rigid, with 3 very strong, often red nerves. *Male*: Scape 1 ft. long, glabrate or very silky. Flowers scattered on long branches, pedicelled. Perianth  $\frac{1}{2}$  in. diam., rotate with a hemispherical tube, cut to below the middle; segments broadly linear-oblong, acute. Stamens on the middle of the segments; filaments slender; anthers broadly oblong. *Female*: Scape shorter, stout, much branched. Flowers stoutly pedicelled. Perianth of the male. Ovary conical; 3-gonous. Berry 3-celled, with a stout style, sunk in the baccate tube of the perianth, yellow. Seeds black, shining, angled.

**Northern** Island: forming dense masses in alpine bogs, *Banks and Solander*; Taupo and Ruahine range, *Colenso*. **Middle** Island: Nelson mountains, alt. 5000 ft., *Bidwill*; Akaroa, *Raoul*; Canterbury, alpine meadows, amongst grass, alt. 2500-5000 ft., *Haast*; Otago, *Lindsay*.

4. ***A. Solandri***, *A. Cunn.*;—*Fl. N. Z.* i. 260. A very large species. Leaves 2-4 ft. long, spreading and recurved, 3 in. broad at the base, and there clothed with dense, snow-white silky, villous wool, glabrous above, silky below, with 3 very strong nerves. *Male*: Scape stout. Panicle 6-18 in. long; branches, with the flowers on, 1 in. across. Flowers very crowded, shortly pedicelled. Perianth very large,  $\frac{1}{2}$  in. long, membranous; segments linear, obtuse, silky externally. Filaments  $\frac{1}{2}$  in. long; anthers linear-oblong. *Female*: Scape stout, curved. Panicle with very long slender (rarely short, stout) branches, 8-12 in. long. Flowers close-set, fasciated or whorled; pedicels slender,  $\frac{1}{4}$  in. long. Perianth much smaller and more scarious than in the male; tube hemispheric; segments recurved. Ovary globose, 3-celled; style straight.

**Northern** and **Middle** Islands: common on trunks of trees, *Banks and Solander*, etc. I have no positive assurance of the plants here described as male and female belonging to one species, but have no reason to doubt it.

5. ***A. Banksii***, *A. Cunn.*;—*Fl. N. Z.* i. 260. Habit and foliage as in *A. Cunninghamii*. Leaves 2-5 ft. long,  $\frac{1}{3}$ - $\frac{2}{3}$  in. broad, glabrous or silky. *Male*: Panicle densely silky; branches long, slender. Perianth glabrous,  $\frac{1}{4}$  in. diam.; segments narrow, acuminate. Filaments subulate; anthers broadly



oblong. *Female*: Panicle shorter; branches stout, crowded, 3-4 in. long. Perianth broad, silky, not enclosing the berry. Ovary conical, 3-celled. Berry ovoid, yellowish,  $\frac{1}{3}$  in. long; stigma sessile. Seeds 3-6, pendulous by slender funicles from the top of each cell, sharply angled; testa thick, hard.—*A. Richardi*, Kunth; ? *Hamelinia veratroides*, A. Rich. Flor. 158: t. 24.

**Northern Island**: on limbs of forest trees, probably common; Mercury Bay, *Jolliffe*. It is difficult to distinguish the male of this from that of *A. Cunninghamii*.

## 6. ARTHROPODIUM, Brown.

Herbs, with fleshy, fibrous roots. Leaves narrow, radical, flaccid. Flowers paniced or racemed on a long scape, white; pedicels jointed in the middle, hermaphrodite. Perianth of 6 spreading, persistent leaflets. Stamens 6; filaments bearded. Ovary 3-celled; style slender, stigma hispid; ovules numerous in each cell. Capsule subglobose, 3-valved, few-seeded. Seeds angular; testa black, membranous; embryo curved.

A small Australian and Tasmanian genus.

Scape 1-2 ft. Flowers  $\frac{3}{4}$ -1 in. diam. . . . . 1. *A. cirrhatum*.  
Scape 4-8 in. Flowers  $\frac{1}{4}$  in. diam. . . . . 2. *A. candidum*.

1. ***A. cirrhatum***, Br.; —*Fl. N. Z.* i. 254. A tall herb, 1-2 ft. high, quite glabrous. Leaves ensiform-lanceolate, acuminate with attenuated points, 1 ft. long,  $1\frac{1}{2}$  in. broad. Panicle much branched; bracts foliaceous. Flowers white,  $\frac{3}{4}$ -1 in. diam.; leaflets lanceolate, acuminate. Filaments bearded above the middle, 2-glandular at the base. Capsule  $\frac{1}{3}$  in. diam. Seeds black, opaque, angular.—*Bot. Mag. t.* 2350; *Anthericum cirrhatum*, Forst.

**Northern Island**: abundant, *Banks and Solander*, etc.

2. ***A. candidum***, *Raoul, Choix*, 14. t. 6; —*Fl. N. Z.* i. 254. A small, slender species, 4-8 in. high. Leaves very narrow linear,  $\frac{1}{10}$ - $\frac{1}{2}$  in. broad, flaccid and grass-like. Scape rarely branched, very slender, usually simple. Flowers solitary or in pairs, small, white,  $\frac{1}{4}$  in. diam., on long secund pedicels; bracts long, leafy, lanceolate. Capsule small, globose,  $\frac{1}{6}$  in. diam.

**Northern and Middle Islands**: mountain woods, frequent.

## 7. ANTHERICUM, Linn.

Herbs, with fleshy fibrous roots. Leaves all radical, linear, sheathing at the base. Scape radical. Flowers racemed, often yellow, hermaphrodite, rarely diœcious.—Perianth of 6 equal, spreading leaflets. Stamens 6, inserted at the base of the leaflets; filaments glabrous or bearded. Ovary 3-celled; style simple, stigma 3-lobed; ovules 2 or more in each cell. Capsule 3-celled, 3-valved, few- or many-seeded. Seeds usually compressed and 3-quetrous; testa black.

A large genus, found in various parts of both temperate zones.

Scape stout, 2-3 ft. high. Flowers diœcious . . . . . 1. *A. Rossii*.  
Scape 1 ft. high. Flowers hermaphrodite . . . . . 2. *A. Hookeri*.

1. ***A. Rossii***, *Hook. f.*—*Chrysobactron Rossii*, *Hook. f.* *Fl. Antaret.* i. 72. t. 44, 45. Very robust, 6 in.-3 ft. high; stem at the base often  $1\frac{1}{2}$

in. diam. Leaves very numerous, spreading, 8–16 in. long, 1–1½ broad, very thick, concave, recurved, obtuse, nerveless. Scape stout,  $\frac{1}{4}$ – $\frac{1}{3}$  in. diam. Raceme very dense, 4–6 in. long, 1–2 diam. Flowers diœcious, bright yellow, very densely crowded; pedicels slender, erect,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, lower bracts nearly as long. Perianth  $\frac{1}{3}$  in. diam., expanded in the male plant, erect in the female; segments ovate-oblong, obtuse. Stamens glabrous in the male plant, with slender subulate filaments in the female. Ovary broadly ovoid in the female; style straight, small, stigma small lobed; ovules 1 or 2 in each cell; ovary in the male smaller, conical, with 3 subulate styles. Capsule  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, ovate-oblong, 3-gonous. Seeds linear-oblong, 3-gonous, testa black.

**Lord Auckland's** group and **Campbell's** Island: abundant, *J. D. H.* A magnificent plant. I have seen a specimen 3–4 ft. high, with 3 crowns of leaves from one root, and 7 racemes of flowers, some of them 2-fid.

2. **A. Hookeri**, *Colenso*.—*Chrysobactron Hookeri*, Col.; Fl. N. Z. i. 255. Much smaller than *C. Rossii*, but most variable in stature. Leaves 8–10 in. long,  $\frac{1}{6}$ – $\frac{1}{2}$  broad. Bracts very variable, sometimes as long as the pedicels. Racemes 3–5 in. long. Flowers  $\frac{1}{3}$  in. diam., always hermaphrodite.—Hook. Ic. Pl. t. 817; Bot. Mag. t. 4607.

**Northern** Island: between the Ruahine range and Lake Taupo, *Colenso*. **Middle** Island: apparently abundant throughout, in subalpine pastures.

## 8. PHORMIUM, Forster.

Tall, rigid herbs; stem swollen at the base, with stout, fibrous roots. Leaves all radical, linear-ensiform, distichous, coriaceous, excessively tough. Scape very tall, branched at the top, bracteate. Flowers large, panicled, erect, jointed on the pedicel, hermaphrodite.—Perianth tubular, curved, of 6 leaflets, outer erect, inner with spreading tips. Stamens 6, exserted; filaments unequal, 3 smaller. Ovary 3-celled; style stout, 3-gonous, stigma capitate; ovules numerous, 2-seriate in each cell. Capsule oblong or linear-oblong, obtusely 3-angled, coriaceous or somewhat membranous, loculicidally 3-valved, many-seeded. Seeds compressed; testa lax, black.

A remarkable genus, "New Zealand Flax," confined to New Zealand and Norfolk Island.

Leaves 3–6 ft., obtuse or subacute . . . . . 1. *P. tenax*.  
Leaves 2–3 ft., more acuminate . . . . . 2. *P. Colensoi*.

1. **P. tenax**, *Forst.*;—*Fl. N. Z.* i. 256. A tall, coarse, dark-green, stout, densely-tufted plant. Leaves very thick and coriaceous, 3–6 ft. long, narrow-linear, rigid, erect, dark green above, paler and glaucous below; tip acute or apiculate (not acuminate), keeled, always slit when old. Scapes 5–15 ft. high, dark red, stout. Flowers usually lurid-red or yellow, but very variable in colour, 2 in. long. Perianth-segments nearly straight, obtuse. Pods very variable in length, 4–8 in., black, 3-gonous, coriaceous, straight or twisted.—Bot. Mag. t. 3199.

Throughout the **Northern** Island, abundant, *Banks and Solander*, etc. Also found in Norfolk Island. In the 'New Zealand Flora' I have gone at length into the question of the specific identity of this and the following plant. A re-examination of all the specimens does not alter my

opinion of this and the following being races of one plant; they seem, however, to be permanently distinct, and as they differ in distribution somewhat, and so much in appearance as to be universally distinguished, I have thought it better to retain them as distinct. From Colenso's notes both appear very variable as to colour of flower, from dark-red to yellow, and size, form, and twisting of the capsule; but this is the coarser and less useful plant of the two. The synonymy of the two species, as given in the 'Flora of New Zealand,' has been altered to suit Mr. Colenso's notes on Le Jolis' *P. Cookianum*, which he asserts to be his *P. Forsterianum*, and consequently the following species, to which, however, the name *Forsterianum* cannot be applied, as Forster's plant is undoubtedly the *P. tenax*.

2. **P. Colensoi**, Hook. f., in *Raoul, Choix*.—*P. tenax*,  $\beta$ , Fl. N. Z. i. 256. Smaller in all its parts than *P. tenax*, and usually of a paler green. Leaves 2–3 ft. long, more acuminate, rarely split at the tip. Scapes 3–6 ft. high, usually green. Flowers 1–1½ in. long; inner segments of perianth acuminate, reflexed. Pod as in *P. tenax*, but smaller.—*P. Forsterianum*, Colenso; *P. Cookianum*, Le Jolis.

**Northern** and **Middle** Island, from the East Cape southwards, abundant, and often growing with *P. tenax*.

Dr. Hector informs me of a third species or variety of *Phormium*, from the south-west coast, with short, almost globular capsules.

### 9. HERPOLIRION, Hook. f.

Small alpine herbs, with wiry creeping stems, sending up short scapes clothed with linear leaves, sheathing at the base. Flower hermaphrodite, when in bud enclosed within 1–3 spathes or bracts.—Perianth tubular, campanulate, 6-partite; leaflets linear, nearly equal. Stamens 6; filaments filiform, glabrous or downy; anthers twisted a little. Ovary 3-celled, oblong; style filiform, stigma simple; ovules numerous in each cell. Fruit?

A small genus of one Australian and Tasmanian alpine species, and the following.

1. **H. novæ-Zelandiæ**, Hook. f. Fl. N. Z. i. 258. Leaves 1–2 in. long, spreading or recurved, narrow linear, acuminate, flat or longitudinally folded, striate, glaucous. Flowers waxy-white, tinged with blue in drying, almost sessile amongst the leaves, ¼–½ in. long; bract or spathe solitary. Filaments pubescent.

**Northern** Island: plains near Taupo, Colenso. **Middle** Island: swamps in the alps of Canterbury, of Nelson, Travers, Sinclair, Haast. This may prove the same with the Tasmanian plant.

## ORDER VIII. PALMEÆ.

Trees or shrubs, with simple, erect or climbing stems, or stemless. Leaves simple pinnate or palmately divided, with sheathing bases. Flowers 3-bracteate, sessile in paniced spikes; panicles enclosed when young in one or more sheathing spathes, unisexual.—Perianth inferior, of 6 thick, coriaceous or fleshy leaflets, in 2 series, valvate or contorted in bud. Stamens usually 6; anthers 2-celled, versatile. Ovary 3-celled, or ovaries 3; stigmas 3, sessile; ovule 1, rarely 2, erect in each cell. Fruit or berry 1–3-celled, or 1–3 drupes.

Seed erect or laterally attached, embryo small, in a cavity of the horny albumen.

A very large tropical Order, including the Date, Cocoa-nut, etc., which reaches its highest south latitude in New Zealand.

### 1. ARECA, Linn.

Trees, with simple ringed trunks. Leaves pinnate, rarely entire. Inflorescence axillary.—Flowers monœcious, paniced; males numerous, females few, at the bases of the branches, or flowers ternate, and each female having a male on either side of it. Spathes 2- or 3-leaved. Stamens 6. Ovary 1-3-celled. Drupe with a fibrous inner coat. Embryo at the base of the albumen.

A large tropical, Indian, Australian, and Pacific Island genus, to which the Betel-nut Palm belongs.

1. **A. sapida**, *Soland.*;—*Fl. N. Z.* i. 263. t. 59 and 60. Trunk 6-10 ft. high; 6-8 in. diam.; cylindric, green. Leaves 4-6 ft. long, pinnate; leaflets very narrow-linear, margin replicate, nerves midrib and petiole covered with minute scales. Spathes 2 or 3, white, a foot long. Panicles densely branched, 18-24 in. long, white. Flowers very numerous, crowded, males and females mixed. Perianth-lobes acuminate, outer smaller. Ovary 3-celled; ovules lateral, pendulous. Drupe oblong,  $\frac{1}{2}$  in. long. Albumen surface smooth (not ruminated).—*A. Banksii*, Martius.

**Northern** and **Middle** Islands: as far south as Queen Charlotte's Sound, *Banks and Solander*, etc. Very closely allied to the Norfolk Island *A. Baueri*, which is a larger plant; young inflorescence eaten.

## ORDER IX. JUNCEÆ.

Herbs, leafless or with stiff, rush-like or flat grassy leaves. Stems, or culms cylindric or compressed, bearing cymes heads or panicles of small, bracteate, hermaphrodite flowers.—Perianth of 6 dry, usually brown, lanceolate acuminate leaflets in 2 rows. Stamens 6, rarely 3, inserted at the bases of the leaflets. Ovary 3-angled, 1- or 3-celled; style short or long, stigmas 3, linear; ovules solitary or many in each cell. Capsule included in the persistent perianth, 1-3-celled, loculicidally 3-valved, 1-many-seeded. Seeds minute, albuminous; embryo minute.

A large Order, found in every part of the world, most frequent in the temperate zones.

Glabrous. Style short or 0. Ovary 3-celled, many-ovuled . . . . .	1. JUNCUS.
Glabrous. Style long. Ovary 1-celled, many-ovuled . . . . .	2. ROSTKOVIA.
More or less hairy. Style short. Ovary 1-celled, 3-ovuled . . . . .	3. LUZULA.

### 1. JUNCUS, Linn.

Herbs, glabrous, with annual, fibrous roots, on creeping, jointed root-stocks. Leaves slender or stout, sheathing at the base, terete or flat, jointed internally or not so, sometimes 0, or reduced to sheaths.—Flowers in termi-



nal or lateral cymes heads or panicles, rarely solitary. Ovary 3-celled; style short, rarely distinct; ovules numerous.

A large genus, found all the world over. The species are variable and often difficult of discrimination.

1. *Rhizome stout, creeping. Culms terete.*

Leaves 0; sheaths at the base of the culms, broad, open, obtuse.

Culms 2-3 ft., very stout. Panicle pale. Stamens 6. . . . . 1. *J. vaginatus*.

Culms 1-3 ft., slender. Panicle pale. Stamens 3. . . . . 2. *J. australis*.

Leaves few, terete, very long, pungent; sheaths below then appressed to the culm.

Culms 1-2 ft., rather stout. Panicle brown. Stamens 6. . . . . 3. *J. maritimus*.

Culms 1-3 ft., slender. Panicle pale. Stamens 3. . . . . 4. *J. communis*.

2. *Roots fibrous (rhizome creeping in 8). Culms tufted, usually flattened, leafy at the base.*

Leaves not jointed internally (see also 10. *J. novæ-Zelandiæ*).

Leaves flat or concave, grass-like. Flowers  $\frac{1}{2}$  in. long. . . . . 5. *J. planifolius*.

Densely tufted. Leaves slender. Flowers  $\frac{1}{4}$  in. long. . . . . 6. *J. bufonius*.

Minute. Leaves terete. Flowers 1-3, terminal. . . . . 7. *J. antarcticus*.

*Leaves terete or compressed, the pith jointed internally, often very inconspicuously in J. novæ-Zelandiæ.*

Stout. Cymes divaricating. Flowers capitate,  $\frac{1}{8}$  in. long. . . . . 8. *J. Holoschœnus*.

Slender. Leaves compressed. Flowers 2-8, terminal. Perianth as long as the acute capsule. . . . . 9. *J. scheuzerioides*.

Slender. Leaves filiform. Flowers 3-5, terminal, brown. Perianth shorter than the black, shining, turgid capsule. . . . . 10. *J. novæ-Zelandiæ*.

Slender. Leaves capillary. Flowers 1-3, lateral, pale. Perianth as long as the acute, pale capsule. . . . . 11. *J. capillaceus*.

1. ***J. vaginatus*, Br.;**—*Fl. N. Z.* i. 263. Very stout, tall, pale-coloured. Culms 2-3 ft. high, minutely striate, nearly  $\frac{1}{4}$  in. diam. at the base, leafless, covered with large sheaths at the base. Panicle lateral, dense or loose, very variable in size, branches strict, compressed. Flowers  $\frac{1}{10}$  in. long, fascicled; bracts short, ovate, acute; perianth segments lanceolate, acuminate. Capsules pale, obovoid, obtuse, rather longer than the perianth. Testa produced at each end.

**Northern Island:** wet clay soil near Wellington, *Colenso, Stephenson*; Waitaki, *Sinclair*. An abundant South Australian and Tasmanian plant, and apparently the same as the Chilian *J. procerus*, E. Meyer (*J. Valdiviæ*, Steud.).

2. ***J. australis*, Hook. f. *Fl. Tasman.* ii. 67. t. 134 A.** Quite similar to *J. vaginatus*, but much more slender, panicle very much smaller, and stamens only 3. Culms slender, 1-3 ft. high, leafless. Panicle pale, open or contracted and almost capitate.

**Northern and Middle Islands:** marshy places, probably common, *Colenso, Sinclair, Munro*; as far south as Otago, *Lindsay*. Also abundant in South Australia and Tasmania.

3. ***J. maritimus*, Lamarch;**—*Fl. N. Z.* i. 263. Stout, tall, rather dark-coloured. Culms 1-2 ft. high, leafless, or with 1 or 2 stout, long, terete, pungent leaves, surrounded with large sheaths at the base, finely striate. Panicle large, lateral, effuse, erect, much branched, often a span long, branches strict, compressed. Flowers fascicled,  $\frac{1}{10}$  in. long; bracts as long as the flowers. Perianth segments lanceolate, acuminate. Stamens 6. Capsule ovoid, as long as the perianth. Testa produced at each end.

**Northern and Middle Islands:** abundant on the coasts. Equally abundant in Australia. I.

tralia, Tasmania, all temperate and many tropical countries. European and other specimens are as pale as *J. vaginatus* and *australis*, approaching them very closely.

4. **J. communis**, *E. Meyer*;—*J. effusus*, Linn.;—*Fl. N. Z.* i. 263. Culms slender, finely striate, 1–3 ft. high, clothed at the base with cylindrical, rather appressed sheaths. Leaves few, terete, pungent, finely striate. Panicle lax effuse and spreading or contracted, sometimes capitate. Flowers not fascicled, but often crowded,  $\frac{1}{2}$  in. long. Perianth-segments lanceolate-subulate, acuminate, as long as the obovoid capsule. Stamens 3. Testa loose at each end of the seed.

**Northern** and **Middle** Islands: abundant in stiff, wet soil, etc. The slender habit close sheaths, and presence of leaves, distinguish this from *J. australis*. One of the commonest plants in all temperate countries.

5. **J. planifolius**, *Br.*;—*Fl. N. Z.* i. 263. Culms 6–18 in. high, leafy at the base, stout or slender, compressed, striate. Leaves numerous, grass-like, flat or concave, membranous,  $\frac{1}{20}$ – $\frac{1}{4}$  in. diam.; sheaths open. Panicles terminal, capitate and dense, or open, in branched 3-chotomous cymes; involucre leaves longer or shorter than the panicles or 0. Flowers brown, fascicled,  $\frac{1}{2}$  in. long. Perianth segments acuminate. Stamens 3–6. Capsule prismatic, mucronate, longer or shorter than the perianth. Seeds striate.

Abundant throughout the islands, *Banks and Solander*, etc. **Lord Auckland's** group, *Le Guillon*. A common Australian, Tasmanian, and Chili plant. Habit of a *Luzula*, but perfectly glabrous.

6. **J. bufonius**, *Linn.*;—*Fl. N. Z.* i. 264. A small, pale, annual species, 1–6 in. high, excessively branched from the base, roots fibrous. Leaves numerous, slender, compressed, linear-subulate, with long large sheaths, pith continuous inside. Flowers fascicled, usually in threes; fascicles lateral, sessile, solitary, or in loose long pedicelled sparingly-branched cymes,  $\frac{1}{4}$  in. long. Perianth-segments narrow, subulate-lanceolate, long-acuminate, with broad membranous margins. Stamens 6. Capsule elongate, prismatic, longer than the perianth. Seeds ovate-globose, pale, shining.—*J. plebejus*, *Br.*

Damp clay soil, etc., throughout the **Northern** and **Middle** Islands. One of the commonest plants in the islands, and in all temperate countries.

7. **J. antarcticus**, *Hook. f. Fl. Antarct.* i. 79. t. 46. A minute, tufted species. Culms 1–2 in. high, branched at the base. Leaves  $\frac{1}{2}$ –1 in. long, subulate, nearly terete, obtuse; pith continuous inside; sheath short, rather broad. Flowers 1–4, fascicled at the top of the culm,  $\frac{1}{10}$  in. long, sessile. Perianth-segments lanceolate, acuminate. Stamens 6. Capsule as long as the perianth, ovoid. Seeds ovoid or oblong, pale, smooth.

**Campbell's** Island: on the exposed mountain-tops, in wet places, *J. D. H.* This appears to be the same with a small Chilian species, (unnamed) collected by Gillies at San Pedro Nolasco, but the specimens are insufficient for an accurate comparison.

8. **J. Holoschoenus**, *Br.*;—*J. cephalotes*, *Thunb.*;—*Fl. N. Z.* i. 263. Culms erect, leafy, from a creeping perennial rhizome. Leaves and involucre slender, compressed, acuminate, pith jointed within. Flowers fascicled,  $\frac{1}{8}$  in. long; fascicles collected into lateral cymes, with spreading, often divaricating

branches; involucre leaf solitary. Perianth-segments lanceolate, acuminate. Stamens 6. Capsule prismatic, as long as the perianth. Seeds linear-oblong; testa striate and rugose, produced at each end.

**Northern Island:** east coast, *Colenso*. I have only tops of culms, and so cannot certainly identify this plant, which is common in Australia and Tasmania. It is probably the same with Thunberg's *J. cephalotes*, which extends over Asia, Africa, Southern Europe, and parts of America.

9. ***J. scheuzerioides*, Gaud.**;—*Fl. Antarct.* i. 79. Culms short, tufted, leafy, fastigiate branched at the base, 1–8 in. high. Leaves compressed, linear-subulate, much longer than the culms; pith jointed inside. Flowers 2–8, in a small, terminal fascicle,  $\frac{1}{10}$ – $\frac{1}{6}$  in. long; bract setaceous or 0. Perianth-segments ovate-lanceolate, acuminate. Stamens 6. Style evident. Capsule as long as the perianth, ovate-oblong. Seeds ovoid, smooth; testa with a delicate outer membrane.

**Middle Island:** Otago, lake district, alpine, *Hector and Buchanan*. **Lord Auckland's** group and **Campbell's** Islands: in boggy places, *J. D. H.* Probably common in alpine bogs throughout the islands. Also found in the Falkland Islands, Fuegia, Chili, and the Andes of Ecuador.

10. ***J. novæ-Zelandiæ*, Hook. f. *Fl. N. Z.* i. 264.** Culms very slender, tufted, 2–6 in. high, leafy. Leaves longer or shorter than the culms, very slender, filiform, terete, striated; pith evidently jointed inside where the leaf is broad enough to observe it. Flowers 3–5, in a small terminal fascicle,  $\frac{1}{2}$  in. long, rarely fascicles 2, superimposed; bracts setaceous or 0. Perianth-segments obtuse, red-brown, with white membranous margins. Stamens 6. Capsule broadly obovoid, very turgid, longer than the perianth, nearly black, shining. Seeds small, pale; testa scarcely produced at the ends.

**Northern Island:** bogs, east coast, Manawata and Waipona rivers, etc., *Colenso*. **Middle Island:** Otago, lake district, *Hector and Buchanan*. Probably common in sub-alpine bogs throughout the islands.

11. ***J. capillaceus*, Hook. f. *Fl. N. Z.* i. 264.** Culms very slender, tufted, 2–6 in. high, leafy. Leaves longer or shorter than the culms, setaceous or filiform, terete, striated; pith jointed inside. Flowers 1–3 together, pale, lateral,  $\frac{1}{2}$  in. long. Perianth-segments acute or acuminate. Stamens 6. Capsule prismatic, narrow ovoid, pale, longer than the perianth. Seeds broadly oblong, smooth, minutely striate and reticulate.—*Fl. Tasman.* ii. 65 t. 134 B.

**Northern Island:** east coast, skirts of woods near Eparairua, *Colenso*. Easily distinguished from *J. novæ-Zelandiæ* by the pale flowers and capsule.

## 2. ROSTKOVIA, Desvaux.

Characters of *Juncus*, except that the flowers are large, solitary, terminal; the ovary 1-celled, and the style long; all have creeping rhizomes, and erect, rigid, terete culms and leaves. Testa very thick.

A small genus, native of the islands south of New Zealand and of Fuegia.

Flowers  $\frac{1}{4}$  in. long . . . . . 1. *R. magellanica*.  
Flowers  $\frac{3}{4}$ –1 in. long . . . . . 2. *R. gracilis*.

1. ***R. magellanica*, Hook. f. *Fl. Antarct.* i. 81.** Culms simple, tufted,  
U 2

compressed below, 6–8 in. long. Leaves longer than the culms, numerous, strict, erect, rigid, concave in front, pungent, polished. Flowers  $\frac{1}{4}$  in. long, 2-bracteate; lower bract subulate, scarcely equalling the perianth; upper 2–4 times longer, ovate-lanceolate below, then subulate. Perianth-leaflets chestnut-brown, linear-oblong, acute or acuminate, outer larger. Stamens included; anthers linear; connective unguiculate. Ovary oblong, 3-gonous; style stout; stigmas exserted. Capsule prismatic, acute, longer than the perianth, lenticular, obtuse, even.—*Rostkovia sphaerocarpa*, Desvaux; *Juncus Magellanicus*, Lamarek.

**Campbell's** Island: bogs on the hills, *J. D. H.* Also found in the Falkland Islands, and Fuegia, and on the Andes of Quito, at 13,000 ft. elevation.

2. *R. gracilis*, Hook. f. *Fl. Antart.* i. 83. t. 47. Much larger than *R. Magellanica*. Leaves 9–12 in. long, three times longer than the culms, very slender, terete. Flowers  $\frac{2}{3}$ –1 in. long.

**Lord Auckland's** group: rocky places and bare ground on the hills, *J. D. H.* Allied to the Fuegian *R. grandiflora*.

### 3. LUZULA, De Candolle.

More or less hairy, tufted, grass-like herbs. Leaves flat or involute, sheathing at the base. Flowers in terminal branched panicles cymes or heads, 2-bracteate at the base.—Stamens 6. Ovary 1-celled; style 1, stigmas 3, filiform; ovules 3, basal. Capsule 1-celled, 3-sceded.

A genus of temperate and frigid regions, not found in tropical climates. The species are excessively variable; the following are very possibly all referable to one.

*Leaves usually flat, 1 or more in. long, ciliate with long hairs.*

Culms slender. Bracts nearly entire or toothed, slightly ciliate . . . 1. *L. campestris*.

Culms stout. Leaves broad, with cartilaginous margins. Bracts sub-ciliate and toothed . . . 2. *L. Oldfieldii*.

Culms stout. Leaves broad, with cartilaginous margins. Bracts lacerate and ciliate . . . 3. *L. crinita*.

*Leaves less than 1 in. long, subulate, very concave, not ciliate.*

Perianth-leaflets acuminate . . . 4. *L. pumila*.

Perianth-leaflets obtuse or acute . . . 5. *L. Colensoi*.

1. *L. campestris*, De Cand.;—*Fl. N. Z.* i. 264. Culms slender, leafy, 2–16 in. high. Leaves  $\frac{1}{2}$ –12 in. long, flat and grass-like, with long white hairs on the margins and sheaths towards the base. Flowers fasciated, arranged in small heads on the long or short branches of irregular cymes, or collected into dense ovoid heads. Bracts membranous; margins slightly ciliated, entire or nearly so. Perianth  $\frac{1}{16}$ – $\frac{1}{8}$  in. long; leaflets varying from oblong to lanceolate, acuminate or almost aristate, white chestnut-brown or transparent with brown centre. Anthers longer than the filaments. Capsule broadly obovoid or nearly globose, 3-gonous or 3-lobed.

Var. *a.* Perianth-segments lanceolate-acuminate, chestnut-brown, with narrow white margins.

Var. *β. picta*. Perianth-leaflets lanceolate, long-acuminate, almost awned, with very broad white margins and narrow brown midrib.—*L. picta*, A. Rich.;—*Fl. N. Z.* i. 265.

Var. *γ. pallida*. Perianth-leaflets often white, shorter, broader, acute or acuminate. Inflorescence usually more capitate.



Abundant throughout the **Northern** and **Middle** Islands: *Banks and Solander*, etc. Var.  $\beta$  usually in woods. A most variable plant, found in all temperate parts of the globe; extremely common in temperate Australia and Tasmania. Var.  $\beta$  is the common Tasmanian form.

2. **L. Oldfieldii**, *Hook. f. Fl. Tasm.* ii. 68. More robust than *L. campestris*. Culm stout, 3–8 in. high, leafy. Leaves coriaceous, often  $\frac{1}{3}$  in. broad, flat; margins cartilaginous, ciliate with very long hairs. Flowers in dense ovoid or subglobose, simple or compound, sessile or pedicelled heads,  $\frac{1}{3}$ –1 in. diam. Bracts ciliate, often lacerate. Flowers as in *L. campestris*, but rather larger.

**Middle** Island: Southern Alps, *Haast*; Otago, sand dunes, mouth of the Kaikorai, *Lindsay*; Waitaki valley, in swampy ground, *Hector and Buchanan*. Also a native of the alps of Tasmania. A very distinct form, but no doubt passing into *L. campestris* on one hand, and into *L. crinita* on the other.

3. **L. crinita**, *Hook. f.*;—*Fl. Antarct.* 85. t. 48. Much larger and stouter than *L. campestris*. Leaves much ciliated or glabrate,  $\frac{1}{2}$ – $\frac{1}{6}$  in. broad. Inflorescence a dense, chestnut-brown, broadly ovate, involucrate head,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, very woolly at the base. Bracts with fimbriate, ciliate edges. Perianth-leaflets subulate or lanceolate, much acuminate, with paler but not white borders.

**Lord Auckland's** group and **Campbell's** Island, *J. D. H. Macquarrie's Island, *Frazer*. Closely allied to the Fuegian *L. Alopecurus*, Desv., and probably only a gigantic form of *L. campestris*,  $\alpha$ , with broader leaves and more ciliated bracts.*

4. **L. pumila**, *Hook. f., n. sp.* Small, densely tufted, nearly glabrous, 1–2 in. high. Leaves shorter than the culm,  $\frac{1}{2}$ –1 in. long, linear-subulate, obtuse, coriaceous, convex at the back, concave in front. Culm naked, 1–2 in. high. Flowers in a small, terminal, 4–10-flowered head,  $\frac{1}{2}$  in. long. Bracts ovate, edges ragged. Perianth-leaflets subulate or lanceolate, long-acuminate, chestnut-brown, twice as long as the black capsule.

**Middle** Island: summit of Mount Torlesse and Mount Darwin, alt. 6–7000 ft., *Haast*; Otago, lake district, alpine, *Hector and Buchanan*.

5. **L. Colensoi**, *Hook. f., n. sp.* Very small, densely tufted, nearly glabrous, 1 in. high. Leaves longer than the culm,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, subulate, obtuse, coriaceous, convex at the back, very concave in front. Scape stout, sunk amongst the foliage. Flowers in small, terminal, 6–8-flowered heads,  $\frac{1}{16}$  in. long. Bracts ovate, edges ragged. Perianth-leaflets ovate-oblong, obtuse or acute, white with brown centre, not much longer than the pale capsule.

**Northern** Island: summit of the Ruahine mountains, *Colenso*. Probably only an alpine state of *L. campestris*,  $\gamma$ , but totally different in habit and appearance.

## ORDER X. RESTIACEÆ.

Grass-like or rush-like herbs. Leaves always narrow, sheathing below, the sheath usually split to the base. Flowers in terminal heads, or solitary in the sheaths of the leaves, or in spikelets terminating scapes, small, uni- or bisexual.—Perianth dry, often thin and membranous, of 2–6 leaflets in 2 series, or reduced to imbricating, flower-bearing scales (glumes). Sta-

mens 1-6 (never 5); anthers 1-celled. Ovary 1-3-celled, or of 2 or more free or connate 1-celled carpels; style simple, entire, terminating in 1 or more filiform stigmas; ovules solitary and pendulous in each cell.—Fruit a small nut or utricle or 1-many-celled capsule, 1- rarely 3-seeded. Seeds usually oblong; testa membranous; albumen copious; embryo minute, lenticular.

A large Order of obscure plants, most abundant in Australia and South Africa, very rare in Europe, the rush-like ones differing from *Juncæ* in the 1-celled anthers and unisexual flowers; the grass-like differing from the Grasses in the leaf-sheaths usually split to the base, and in the anthers, habit, and fruit.

Flowers diœcious, in paniced spikelets. Perianth of 6 leaflets . . .	1. LEPTOCARPUS.
Flowers unisexual, few, hidden in the leaf-sheaths. Perianth of 6 leaflets	2. CALOROPHUS.
Flowers unisexual, within 2 glumes. Stamens 2. Stigmas 2 . . .	3. GAIMARDIA.
Flowers unisexual, within 2 glumes. Stamen 1 or 0. Stigmas or ovaries 2-18 . . . . .	4. ALEPYRUM.

### 1. LEPTOCARPUS, Br.

Rush-like plants. Rhizome stout, creeping, scaly. Culms numerous, erect, terete, harsh, jointed, with sheaths at the joints. Male and female inflorescence often dissimilar.—Flowers diœcious, in cylindrical spikelets, which are paniced or fascicled. *Male*: Perianth of 6 dry leaflets in 2 series. Stamens 3, seated round a rudimentary ovary. *Female*: Perianth as in the male. Ovary 1-celled, 3-gonous; stigmas 3, deciduous. Nut enclosed in the perianth, 1-celled, 1-seeded.

A considerable genus, of which the following species is the only extra-Australian member.

1. **L. simplex**, *A. Rich.*;—*Fl. N. Z.* i. 265, *not Brown*. Variable in size, 1-3 ft. high. Rhizomes stout, creeping, scaly; scales chestnut-brown. Culms numerous, simple, slender or stout, terete, smooth. Sheaths distant,  $\frac{1}{4}$  in. long, 1-3 in. apart. *Male*: Spikelets cylindrical, red-brown, peduncled or sessile,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, often in lateral panicles; peduncles glabrous or downy. Glumes ovate-acuminate or lanceolate, longer than the sessile flowers. Outer perianth-segments lanceolate, acuminate; inner half the size, oblong-lanceolate. *Female*: Spikes clustered in ovoid heads, sometimes  $\frac{1}{2}$  in. long, and as broad. Glumes ovate-acuminate. Outer perianth-segments lanceolate; inner smaller, oblong-lanceolate, retuse, apiculate. Stigmas 3, slender.

**Northern** and **Middle** Islands: abundant in marshy places, *Banks* and *Solander*, etc. Extensively used for thatching, etc. Very near the Tasmanian *L. Brownii*, Hook. f. (*L. simplex*, Br.), but the stigmas are much longer, and the inner perianth-leaflets of the female different.

### 2. CALOROPHUS, Labill.

Culms slender, long, flexuose, jointed, simple or excessively branched, with appressed distant sheaths, which sometimes terminate in small leaves at the joints.—Flowers monœcious or diœcious, in short, minute, few-flowered spikelets, that are hidden in the sheaths of the leaves, and surrounded by glumes. *Male*: Perianth of 6 long narrow leaflets. Stamens 3; anthers linear. *Female*: Perianth of 2-6 very short truncate leaflets. Ovary 1-celled;

stigmas 2 or 3, deciduous. Nut hard, surrounded at the base with the persistent perianth.

A small Australian, Tasmanian, and New Zealand genus.

**C. elongata**, Lab.;—*Fl. N. Z.* i. 267. Culms prostrate, 1–3 ft. long, excessively branched from the base; branches flexuose, slender, semiterete, not striated,  $\frac{1}{2\frac{1}{4}}$  in. diam.; sheaths  $\frac{1}{4}$  in. long, with spreading, subulate points. *Male*: Spikelets 4–6-flowered; bract obtuse, bearded. Perianth of 6 linear leaflets, enclosed in pungent glumes. Anthers linear. *Female*: Spikelets 3-flowered. Flowers remote, lower with 2, upper with 6 leaflets. Styles long, tortuous.—Lab. *Fl. Nov. Holl.* ii. 7. t. 228.

Var. *β. minor*. Shorter, more slender. Male spikelet 2-flowered. Female usually 1-flowered.—*C. minor*, *Fl. N. Z.* i. 267.

**Northern Island**: Great Barrier Island, *Sinclair*; swamps at Wangerei, *Colenso*. **Middle Island**: Port Preservation, *Lyall*. Var. *β*, base of Tongariro, *Colenso*; Lake Tennyson, alt. 4400 ft., *Travers*; top of Morse mountain, alt. 6500 ft., *Bidwill*. Both varieties are Australian and Tasmanian plants.

In the 'New Zealand Flora' I have referred a third New Zealand plant from Chatham Island, collected by Dieffenbach, which is out of flower, provisionally to this genus; it has erect, much-branched stems, 2 ft. high, smooth and polished, neither striate nor flexuose; sheaths with acuminate points.

### 3. GAIMARDIA, Gaudichaud.

Very small, moss-like, densely-tufted plants, glabrous, bright green. Leaves imbricate, setaceous, with broad membranous sheaths.—Spikelets minute, on a short terminal scape, of 2 glumes enclosing 1 or 2 unisexual flowers. Perianth 0. Stamens 2. Ovaries 2, connate; stigmas 2, filiform. Capsule membranous, 2-celled, 2-valved, 2-seeded.

A small genus found in the New Zealand islands and Antarctic America.

Leaves setaceous, with acicular points; sheaths glabrous . . . . . 1. *G. setacea*.  
Leaves setaceous, obtuse; sheaths ciliated . . . . . 2. *G. ciliata*.

1. **G. setacea**, Hook. f. *Fl. N. Z.* i. 267. Tufted, forming large moss-like patches; stems 1–2 in. high. Leaves setaceous, imbricating,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, with long acicular points, and broad, membranous, often lacerate sheaths produced upwards. Scape erect,  $\frac{1}{2}$  in. long. Outer scale larger,  $\frac{1}{1\frac{1}{2}}$  in. long, convolute, linear-oblong, obtuse; inner narrow, with a terete tip.

**Middle Island**: Port Preservation, *Lyall*.

2. **G. ciliata**, Hook. f.;—*Fl. Antarct.* i. 86. Very similar to *G. setacea*, but the leaves are obtuse, and the membranous sheaths excessively ciliated.

**Lord Auckland's** group, forming dense moss-like tufts on the hills, *J. D. H.*

### 4. ALEPYRUM, Br.

Very small, tufted, moss-like herbs. Leaves subulate, soft, with broad, membranous white sheaths.—Spikelets minute, on a short terminal scape, of 2 glumes enclosing 1 or 2 flowers. Stamens 1 or 2; filament very long and slender. Ovaries 2–18, connate or free; stigmas as many, free or connate, filiform. Capsules 2–18, membranous, 1-seeded.

A small Australian, Tasmanian, and New Zealand genus, which should probably be united with *Gaimardia*.

1. **A. pallidum**, Hook. f. *Fl. N. Z.* i. 268. t. 62 C. A minute, tufted, moss-like, soft, pale green plant; stems  $\frac{1}{2}$ –1 in. high. Leaves  $\frac{1}{4}$  in. long, subulate; sheaths broad, membranous, transparent. Scape shorter than the leaves. Stamen 1. Ovary solitary or 2–4, united in pairs or threes (or 2 to each glume); styles very long.—*Gaimardia* (?) *pallida*, Fl. Antarct. 86.

**Northern** Island: tops of the Ruahine mountains, near the snow, *Colenso*. **Campbell's** Island, forming tufts on the hills, *J. D. H.*

## ORDER XI. CYPERACEÆ.

Grass-like or rush-like herbs, with fibrous roots. Culms solid, usually 3-gonous, sometimes compressed flat or terete; sheaths not split to the base. —Flowers unisexual or hermaphrodite, in the axils of small scales (glumes), which form spikelets, being either imbricated all round a rachis or distichous. Glumes usually rigid, compressed, concave or convolute, obtuse cuspidate or awned, usually persistent, the lower empty or all floriferous. Perianth generally 0, sometimes of 3–6 or more hypogynous bristles or scales (the ovary of *Carex* and *Uncinia* is contained in a utricle or false perianth). Stamens 1–6; filaments flat, slender, sometimes elongating after flowering; anthers linear, inserted by the base, 2-celled, often with a claw at the tip. Ovary 1-celled; style 1, stigmas 1–3, filiform; ovule 1, erect, anatropous. Nut minute, compressed or 3-gonous. Seed filling the nut; embryo at the base of copious floury albumen.

An immense Natural Order, found in all parts of the world, distinguished from Grasses by the rarely round, solid culms; leaf-sheaths not split to the base; absence of evident ligule on the leaf; often 3-ranked leaves; anthers not versatile; separable, thick pericarp; stigmas not plumose; embryo not on one side of the base of the albumen, but at the very base; and structure of the spikes and spikelets.

### A. Spikelets 1- or more flowered. Flowers hermaphrodite.

*Spikelets compressed. Glumes few or many, persistent, more or less distichous (rarely imbricated all round in Schœnus).*

Glumes many, keeled, all floriferous. Bristles 0 . . . . .	1. CYPERUS.
Glumes few, upper 1–3 floriferous. Bristles 0 or 3–6 . . . . .	2. SCHÆNUS.
Glumes free, upper 1 floriferous. Bristles large, flat, plumose . . . . .	3. CARPHA.

*Spikelets terete. Glumes few or many, imbricate all round. (See Schœnus in previous section.)*

Spikelets usually lateral, numerous. Glumes many, most floriferous.

Stamens 1–3. Bristles 2–8 . . . . .	4. SCIRPUS.
Spikelets solitary, terminal. Glumes as in <i>Scirpus</i> . Bristles 3–6 . . . . .	5. ELEOCHARIS.
Spikelets small, usually lateral. Glumes as in <i>Scirpus</i> . Bristles 0 . . . . .	6. ISOLEPIS.
Spikelets spirally arranged on the leafy culm. Glumes and flowers as in <i>Scirpus</i> . . . . .	7. DESMOSCHÆNUS.
Spikelets umbelled. Glumes many, most floriferous. Stamen 1. Base of style tumid, hairy . . . . .	8. FIMBRISTYLIS.
Spikelets fascicled. Glumes many or few, 1–3-floriferous. Bristles 0. Stamens 3, rarely clougating . . . . .	9. CLADIUM.
Spikelets panieled. Glumes few, 1 floriferous. Stamens 3–6, much elongating. Bristles or scales 0 . . . . .	10. GAHNIA.
Spikelets panieled. Glumes few, 1–2 floriferous. Stamens 3. Scales 6, minute . . . . .	11. LEPIDOSPERMA.



*Spikelets of 2 1-flowered deciduous glumes. Nut on a naked scape.*

Tufted, rigid, low, dense herb, with subulate leaves . . . . 12. *OREOBOLUS*.

B. *Spikelets solitary or numerous, many-flowered. Flowers unisexual.*

Female utricle with an ovary and long hooked bristle . . . . 13. *UNCINIA*.

Female utricle with an ovary only, or rarely with one straight bristle 14. *CAREX*.

## 1. *CYPERUS*, Linn.

Rhizomes creeping or tufted. Culms erect, leafy or leafless. Leaves various.—Spikelets compressed, many-flowered, very variously disposed, solitary or numerous, often umbellate; umbels involucre. Glumes numerous, distichous, much compressed, all or most floriferous. Stamens 3. Bristles 0. Nut 3-quetrous; style deciduous, not jointed nor tumid at the base. Stigmas 3.

A most extensive, chiefly tropical genus, extending sparingly into the temperate zone.

1. *C. ustulatus*, *A. Rich.*;—*Fl. N. Z.* i. 268. Tall, coarse, leafy, 2–4 ft. high. Culms usually 3-gonous, stout, smooth,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam. Leaves long, keeled, coriaceous, margins serrulate or rough. Involucre of many grassy leaves, 6–12 in. long. Umbels of 6–10 long or short rays. Spikelets  $\frac{1}{4}$ –1 in. long, densely arranged in oblong spikes,  $\frac{1}{2}$ –1 in. long, dark red-brown, sessile, suberect. Glumes 6–20, broadly oblong, obtuse or mucronate, sulcate, convex at the base, shining. Nut oblong, narrowed at both ends, dark-brown.—*A. Rich. Flor.* 101. t. 17.

Abundant in marshes throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc.

## 2. *SCHÆNUS*, Linn.

(Including *CHÆTOSPORA*, Br.)

Tufted or creeping plants, often rigid, with long or short culms and usually creeping rhizomes. Leaves narrow or 0.—Spikelets usually few, panicled fascicled or crowded, compressed, rarely nearly terete. Glumes few, distichous, rarely imbricate all round the rachis, usually convex at the back, often hard and brown, lower empty, upper 2 or 3 floriferous. Stamens 3. Bristles 0 or 3–6, usually scabrid, rarely plumose. Nut compressed or 3-gonous; style continuous with its top, not jointed nor swollen. Stigmas 2 or 3.

A very widely-diffused genus in the temperate zones of both hemispheres. The species with terete spikelets are with difficulty distinguished from *Scirpus*, except by habit and the fewer flowers.

*Spikelets solitary, compressed. Glumes obviously distichous.*

Small, usually creeping, leafy. Spikelets axillary, subsolitary. . . . 1. *S. axillaris*.

*Spikelets distinctly compressed, panicled fascicled or crowded.*

Culms 1–2 ft. Spikelets panicled, 1 in. long. Bristles 0 . . . . 2. *S. tenax*.

Culms 1–2 ft. Spikelets panicled,  $\frac{1}{4}$  in. long. Bristles very short . . . 3. *S. Tendo*.

Culms 1–3 ft. Spikelets panicled,  $\frac{1}{4}$  in. long. Bristles 6, long . . . 4. *S. pauciflorus*.

Culms 4–12 in. Spikelets crowded,  $\frac{1}{8}$ – $\frac{1}{10}$  in. Bristles 6, long . . . 5. *S. Brownii*.

*Spikelets terete or obscurely compressed. Glumes obscurely distichous.*

Culms 1–2 in. Spikelet solitary. Bristles 6, simple . . . . 6. *S. concinnus*.

Culms 2–10 in. Spikelets crowded. Bristles 6, plumose . . . . 7. *S. nitens*.

1. **S. axillaris**, *Hook. f.*—*Chœtospora axillaris*, Br. ;—Fl. N. Z. i. 274. t. 62 A. Tufted, small, flaccid, pale green, leafy. Culms branched, often creeping, 1–4 in. long, very slender, compressed. Leaves spreading, alternate,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long,  $\frac{1}{30}$  broad, very narrow linear, obtuse. Spikelets 1–3 together, axillary, shortly peduncled,  $\frac{1}{12}$ – $\frac{1}{8}$  in. long, pale brown. Glumes 4–6, lanceolate, acute, pale brown, 1 or 2 upper floriferous; keel scabrid, green. Bristles 3–6, longer than the ovary. Stamens 3. Nut small, white, polished, broadly ovate, 3-gonous, tapering into the slender style. Stigmas 3.—*Scirpus foliatus*, *Hook. f.* in Journ. Bot. iii. 614.

**Northern** Island: abundant in wet places. Probably overlooked in the Middle Island. Also found in Australia and Tasmania.

2. **S. tenax**, *Hook. f.*—*Chœtospora tenax*, Fl. N. Z. i. 273. Leafless. Culms rigid, tufted, erect, 1–2 ft. high, terete or compressed, polished; sheaths at the base red-brown, with subulate blades 1 in. long. Spikelets compressed,  $\frac{1}{3}$  in. long, lanceolate, pale brown, 2- or 3-flowered, in a contracted panicle 2–5 in. long; branches slender, longer than the sheaths. Glumes 6–8, distichous, ovate-lanceolate, acute, pale-brown, not shining, concave, nerveless, subciliate. Bristles 0. Nut turgid, 3-gonous; angles thick, transversely waved. Stigmas 2 or 3.

**Northern** and **Middle** Islands: dry hills, abundant, *Banks and Solander*, etc.

3. **S. Tendo**, *Banks and Solander*.—*Chœtospora Tendo*, Fl. N. Z. i. 273. Very similar to *S. tenax*, but much more slender. Culms with 1 deep groove throughout their length. Spikelets only  $\frac{1}{4}$  in. long, much darker. Bristles present, but few and short. Nut quite smooth.

**Northern** Island: Opuragi, *Banks and Solander*; Clay hills, Bay of Islands, Auckland, etc., *Sinclair*, etc., abundant.

4. **S. pauciflorus**, *Hook. f.* Fl. N. Z. i. 273. Culms tufted, very slender, 1–3 ft. high, pale, leafy at the base, angled and grooved. Leaves subulate, grooved, rigid, erect; sheaths long, grooved, dark chestnut-brown, shining. Panicle lateral, solitary, short. Spikelets few, slender, pedicelled,  $\frac{1}{4}$  in. long, lanceolate, dark-brown, polished, 3- or 4-flowered. Glumes distichous, acuminate; keel green. Bristles 6, capillary, as long as the very long style. Nut narrow-oblong, pale-brown, shining, striated with impressed dots. Stigmas 3.

**Northern** Island: marshes near Patea and base of Tongariro, *Colenso*. **Middle** Island: swamps, base of Mount Sinclair, alt. 2200 ft., *Sinclair and Haast*; Otago, Lindis Pass, subalpine, alt. 2–4000 ft., *Hector and Buchanan*. The true “Snow Grass,” according to Buchanan. Very near the South Chilian *Chœtospora antarctica*, *Hook. f.*, but the leaves are much shorter.

5. **S. Brownii**, *Hook. f.*—*Chœtospora imberbis*, Br. ;—Fl. N. Z. i. 274. Culms densely tufted, very leafy, 4–10 in. high, grooved, slender, rather flaccid. Leaves alternate, very narrow linear, acuminate, channelled above, striate below longer than the culms; sheaths red-brown, deeply grooved. Spikelets lateral, fascicled, 3–6 together, shortly pedicelled,  $\frac{1}{10}$ – $\frac{1}{8}$  in. long, 1- or 2-flowered, lanceolate. Glumes few, lanceolate-oblong; upper obtuse, almost black, margins pale; lower with hispid points. Bristles 6, slender.

Nut (in Tasmanian specimens) white, broadly obovate, 3-gonous, grooved, with impressed dots in the grooves.

**Northern Island:** east coast, *Colenso*. A very common Australian and Tasmanian plant, allied to *S. axillaris*, but very much larger with long leaves. The *Schæenus imberbis*, A. Cunn., is not the plant of Browu, which has no bristles.

6. **S. concinnus**, Hook. f.—*Chætophora concinna*, Fl. N. Z. i. 274. t. 62 B. Rhizome slender, creeping. Culms tufted, leafy, erect, very slender, 1–2 in. high, rigid, curved. Leaves shorter than the culms, setaceous, grooved; sheaths almost black. Spikelet nearly terminal, solitary, suberect, slightly compressed,  $\frac{1}{6}$ – $\frac{1}{5}$  in. long, 2- or 3-flowered, dark-brown. Glumes 5 or 6, scarcely distichous, oblong-lanceolate, obtuse, quite glabrous. Bristles 6, very slender. Nut pale-brown, smooth, with a dense brush of hairs at the base, broadly ovate, 3-gonous; tip and style scabrid. Stigmas 3.

**Northern Island:** foot of Tongariro, and moist bases of cliffs on the east coast, *Colenso*.

7. **S. nitens**, Hook. f.—*Chætophora nitens*, Br.; Fl. N. Z. i. 82. Rhizome slender, creeping. Culms densely tufted, 2–12 in. high, wiry, rigid, slender, leafy at the base. Leaves slender, erect, longer than the culms, semiterete, deeply grooved in front; sheaths black-brown, shining. Spikelets sessile, fascicled, 2–10 together, terminal or nearly so,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, ovoid, turgid, 2- or 3-flowered, dark-brown, shining. Glumes obscurely distichous, 4–6, broadly ovate, obtuse, nerveless, grooved. Bristles numerous, or 6 plumose at the base. Nut pale-brown, smooth, 3-gonous. Stigmas 3.

**Northern Island:** sandy flats, Porangahau, and Cape Palliser, *Colenso*. A very common Tasmanian and Australian plant, most closely allied to a South Chilean one. It is doubtful whether the bristles are 6 and divided to the base, or very numerous.

### 3. CARPHA, Banks and Solander.

Tufted, grass-like herbs. Leaves narrow linear, rigid, obtuse. Culm cylindric, obtusely 3-angled or compressed.—Spikelets in fascicles or corymbs, subtended by sheathing bracts, pale-yellow, compressed. Glumes distichous, few; lower small, empty; upper large, opposite, 1 floriferous; uppermost small. Bristles 3, or 6 in 2 series, as long as the glumes, plumose. Stamens 3. Nut 3-gonous, 3-ribbed; base of style long, conical, persistent.

A small genus, native of Australia, Tasmania, New Zealand, and Fuegia.

1. **C. alpina**, Br.;—*Fl. N. Z. i. 273*. Culms 1–12 in. high, longer or shorter than the leaves. Leaves grooved above, with broad, shining, smooth or slightly scabrid sheaths. Spikelets fascicled,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long. Glumes 4–6, linear-oblong, glabrous, shining, concave. Bristles large, flat, feathery. Stigmas 2.

**Northern Island:** Taupo plains and top of the Ruahine range, *Colenso*. **Middle Island:** Nelson mountains, alt. 4–5000 ft., *Bidwill*; Chalky Bay, *Lyall*. Also a native of the alps of South-east Australia and Tasmania.

### 4. SCIRPUS, Linn.

Culms erect from creeping rhizomes, 3-gonous or 3-quetrous, stout or slender, leafy or leafless, sheathed at the base.—Spikelets fascicled umbelled panicled or corymbose, terete or angled, rarely compressed. Glumes nume-

rous, imbricated all round the rachis, all or most floriferous. Bristles 2-8, usually scabrid. Stamens 1-3. Nut 3-gonous or compressed, tipped with the persistent, often swollen base of the style. Stigmas 2 or 3.

A very extensive genus, found in all parts of the globe, chiefly in watery places.

Culms 3-gonous, leafy. Leaves flat. Spikelets terminal. Involucre long,

leafy . . . . . 1. *S. maritimus*.

Culms terete, spongy, leafless. Spikelets lateral . . . . . 2. *S. lacustris*.

Culms 3-quetrous, leafy at base. Leaves 3-quetrous. Spikelets lateral . 3. *S. triqueter*.

1. ***S. maritimus***, *Linn.*;—*Fl. N. Z.* i. 269. Roots tuberous. Culms leafy, 2-6 ft. high, acutely 3-gonous. Leaves long, flat, keeled, edges scabrid. Umbels terminal, involucre, irregular; rays 6-10. Spikelets 1-3, sessile, ovoid, pale brown,  $\frac{1}{2}$  in. long; involucre leaves long, grassy. Glumes numerous, glabrous or scaberulous, membranous, ovate, obtuse, entire or 2-fid, awned or mucronate. Nut 3-gonous or ovate, compressed. Bristles 2 or 3, retrorsely scabrid. Anthers twisted after flowering, apiculate. Stigmas 2 or 3.

**Northern** and **Middle** Islands: near the sea, *Banks* and *Solander*, etc., abundant. Root formerly eaten by the natives. Abundant in Australia, Tasmania, and most other temperate parts of the world.

2. ***S. lacustris***, *Linn.*;—*Fl. N. Z.* i. 269. Rhizome stout, creeping. Culms terete, leafless, spongy, 2-8 ft. high, sheathed at the base. Spikelets in lateral irregular panicles, ovoid,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long. Glumes broadly ovate, membranous, obtusely 3-fid, mucronate, ciliate. Bristles 6, retrorsely scabrid. Anthers apiculate. Nut 3-gonous, shortly obovoid.

Abundant in lakes, pools, etc., throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. Also found in all temperate and many tropical countries. Used in Europe for coopering casks, making mats, packing bottles, etc.

3. ***S. triqueter***, *Linn.*;—*Fl. N. Z.* i. 269. Rhizomes stout, creeping. Culms rather slender, 1-2 ft. high, 3-quetrous. Leaves few, like the culms. Spikelets 1 or more, fascicled, sessile, lateral,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, broadly ovoid, dark-brown. Glumes membranous, broadly obovate-oblong, often ciliate, bracteate, 2-fid, with a short stiff awn. Anthers with a rather long point, twisted after flowering. Nut, bristles, etc., as in *S. maritimus*.

Common throughout the **Northern** and **Middle** Islands, in wet places, *Banks* and *Solander*, etc. Also found in Australia, Tasmania, and many other parts of the world.

## 5. **ELEOCHARIS**, Br.

Culms tufted, erect, terete, usually simple and leafless, sheathed at the base.—Spikelet solitary, terminal, erect, terete or angled. Glumes numerous, imbricated all round the rachis, most floriferous. Bristles 3-6, scabrid. Stamens 3. Nut 3-gonous or compressed, swollen at the top. Style jointed at the base, deciduous.

A large genus in the northern hemisphere, temperate and subtropical, rarer in the southern.

Culms stout, hollow, septate . . . . . 1. *E. sphacelatus*.

Culms slender, pith continuous . . . . . 2. *E. gracilis*.

1. ***E. sphacelata***, *Br.*;—*Fl. N. Z.* i. 269. Culms as thick as the little



finger, 1–2 ft. high, cylindrical, hollow, with distant joints, contracted towards the top, stoloniferous at the base. Spikelet 1–2 in. long, terminal, solitary, erect, cylindric. Glumes numerous, linear-oblong, obtuse, membranous, flat,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long. Bristles 6–8, stout, retrorsely scabrid. Nut obovoid, compressed.

**Northern Island**: in marshy places, *Cunningham*, *Colenso*; Bluff Island, *Lyall*; Auckland, *Sinclair*. A common Indian, Pacific Island, and Australian plant, usually tropical, but extending into Tasmania.

2. ***E. gracilis*, Br.**;—*Fl. N. Z.* i. 270. Culms creeping, deeply grooved, slender, striate, cellular, 6–24 in. high, sheathed at the base, sheaths chestnut-brown, mucronate. Spikelet very pale, white or reddish, terete,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, narrow, ovoid, subacute. Glumes few, linear-oblong or obovate, obtuse, membranous, transparent, flat. Bristles 4–6, retrorsely scabrid. Nut broadly obovate, compressed, 3-gonous, shining. Stigmas 3.

Var. *β. gracillima*. Culms very slender. Spikelet short. Glumes ovate-oblong, lower longer. Bristles 5 or 6, longer than the nut.—*E. acicularis*, A. Cunn., not Linn.

Var. *γ. radicans*. Small, rhizome stout, creeping, almost woody. Culms filiform, 2–3 in. high. Spikelet  $\frac{1}{6}$ – $\frac{1}{8}$  in. long. Glumes few. Bristles 6.

Common in boggy places throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. Var. *β.* Bay of Islands. Var. *γ.* Bay of Islands, in sandy places. Also abundant in Australia and Tasmania. Too nearly allied to the European and almost ubiquitous *E. palustris*, which has only 2 stigmas. The var. *γ* is a very peculiar-looking plant, and may be a different species.

## 6. ISOLEPIS, Br.

Usually very small, slender, tufted green herbs. Leaves slender or 0.—Spikelets small, terete, solitary or fascicled, lateral, rarely paniced or solitary and terminal, basal in *I. basilaris*. Glumes few or numerous, imbricated all round the rachis, most floriferous. Bristles 0. Stamens 1–3. Nut 3-gonous or compressed, usually tumid at the top; style jointed on to its top. Stigmas 2 or 3.

A very large genus, found in all parts of the globe.

Culms stout, leafless, pungent. Spikelets capitate . . . . . 1. *I. nodosus*.

Culms slender, leafless, usually flaccid and proliferous . . . . . 2. *I. prolifer*.

Culms very slender, 1-leaved. Spikelets 1 or 2. Nut smooth . . . . . 3. *I. riparia*.

Culms short, rigid, 1- or 2-leaved. Spikelets 1–3. Nut pitted . . . . . 4. *I. cartilaginea*.

Culms slender, leafy. Spikelets 1 or 2. Nut white, smooth . . . . . 5. *I. aucklandica*.

Culms short, leafy. Spikelets 1 or 2, basilar. Nut obovoid . . . . . 6. *I. basilaris*.

1. ***I. nodosa*, Br.**;—*Fl. N. Z.* i. 270. Culms stout, tall, leafless, 1–3 ft. high, compressed below, cylindric above, sheathed at the base, tips acute. Spikelets aggregated into dense globose heads, below the erect pungent top of the culm, ovoid,  $\frac{1}{3}$  in. long. Glumes broadly ovate, obtuse, coriaceous, concave. Nut compressed, scarcely 3-gonous, smooth, polished, pale-brown, apiculate; stigmas 3.

Throughout the **Northern** and **Middle** Islands: abundant in marshy places, *Banks and Solander*, etc. **Kermadec** Islands, *M'Gillivray*. Also common in Australia and Tasmania, and very closely allied to the widely distributed *I. Holoschaenus*.

2. ***I. prolifer*, Br.**;—*Fl. N. Z.* i. 271. Very variable in size and habit. Culms stout or slender, weak, often filiform, striate, stoloniferous, usually leafless, terete or compressed, 2–12 in. long, sheathed at the base, usually obtuse at the tip. Spikelets small,  $\frac{1}{12}$ – $\frac{1}{8}$  in. long, ovoid, aggregated on

the side of the culm, few or many, rooting and throwing out culms from their base in wet places. Glumes small, coriaceous, red-brown, obtuse, concave in flower, keeled in fruit; striate, red-brown, with green nerves and margin. Stamen 1. Nut broadly obovate, striate, pale, dotted, compressed, 3-gonous. Stigmas 3.—*I. setacea*, A. Cunn. in part, not Br.

Throughout the **Northern** and **Middle** Islands, abundant, *Banks and Solander*, etc. Equally abundant and variable in Australia and Tasmania; also found in S. Africa, St. Helena, and I think the same plant occurs in Chili. More than one species (and perhaps states of some of the following) may be confounded under forms of this.

3. ***I. riparia***, Br.—*I. setacea*, Fl. N. Z. i. 271 in part, not Br. Small, 1–4 in. high, densely tufted. Culms almost filiform, with 1 leaf at the base, tips acute. Leaf setaceous. Spikelet 1, rarely 2, lateral, ovoid,  $\frac{1}{8}$ – $\frac{1}{10}$  in. long. Glumes 5–8, broadly ovate, obtuse, keeled, green or brown. Stamens 3. Nut compressed, 3-gonous, smooth or minutely dotted. Stigmas 3.—Fl. Tasm. ii. 89. t. 145 C.; *I. setosa* (misprint for *setacea*), Raoul.

Common in marshy places throughout the **Northern** and **Middle** Islands. Also found in South Africa and Chili.

4. ***I. cartilaginea***, Br.;—*Fl. N. Z.* i. 271. Culms short, densely tufted, rigid, leafy at the base,  $\frac{3}{4}$ –2 in. high, tips acute. Leaf subulate, channelled, keeled. Spikelets 1 or more, lateral, small,  $\frac{1}{8}$  in. long. Glumes concave, grooved, thickly keeled, very coriaceous, with a thick obtuse mucro and chestnut-brown lines on each side. Stamens 2 or 3. Nut elliptic-oblong, obtusely 3-gonous, white, punctulate. Stigmas 3.—Fl. Tasm. ii. 89. t. 145 A, B.

**Northern** Island: wet places, probably common, but overlooked, *Colenso, Sinclair*. Abundant in Australia, Tasmania, and S. Africa; and I think also in Chili.

5. ***I. aucklandica***, Hook. f. *Fl. Antarct.* i. 88. t. 50. A bright-green, flaccid, very leafy, densely tufted species. Culms 3–5 in. high, rather stout, chestnut-brown, much branched at the base, terete, striate, tips obtuse. Leaves similar to the culms and as long, plano-convex, obtuse. Spikelet 1, rarely 2,  $\frac{1}{12}$ – $\frac{1}{10}$  in. long, broadly ovoid, pale or brown. Glumes 6–8, ovate, concave, coriaceous, obtuse, with an obtuse excurrent thick keel. Stamens 3. Nut 3-gonous, white, quite smooth, not polished. Stigmas 3.

**Northern** Island: marshy places in the interior, *Colenso*. **Lord Auckland's** group and **Campbell's** Island: common in marshes. In many respects this so closely resembles some states of *I. prolifer*, that I should not be surprised if they proved identical, meanwhile the differences in habit are too great to admit of their union; the nut is usually larger and stamens 3. Some of the Chilian specimens named *I. pygmaea* in the 'Flora Antarctica' are certainly identical with this, the nut being rather smaller than usual. It is also very nearly allied to, if not the same as, a S. African plant.

6. ***I. basilaris***, Hook. f., n. sp. Culms small, densely tufted, green, leafy, 1–2 in. high, much branched at the base. Leaves setaceous, plano-convex, channelled above, obtuse at the tip. Spikelets 1 or 2, almost radical,  $\frac{1}{8}$ – $\frac{1}{6}$  in. long, narrow oblong, pale green. Glumes rather numerous, oblong, obtuse, membranous, with an indistinct, thick, excurrent midrib. Stamens 2. Nut much smaller than the glume, broadly obovoid, compressed, not angled nor 3-gonous, pale-brown, smooth, not polished. Stigmas 2.

**Northern** Island: mud banks of Ngaruroro river, *Colenso*. A most distinct little species, with the almost radical spikelets of the Australian *I. acaulis*, and the Cape *I. humilis*, but differing in character from both.

7. **DESMOSCHÆNUS**, Hook. f.

Culms tall, rigid, obtusely 3-gonous, tufted, erect from a stout, woody, scaly rhizome. Leaves squarrose, very harsh, margin scaberulous.—Inflorescence a span long, of clusters of sessile, red-brown, globose spikelets, spirally arranged round the culm, subtended by rigid squarrose subulate leafy bracts. Glumes numerous, imbricate all round the rachis, all or most floriferous. Bristles 0. Stamens 3; anthers with a terminal awn. Nut compressed; style deciduous, not jointed at the base. Stigmas 3.

A very remarkable plant, agreeing with *Isolepis* in the floral characters, but of most peculiar habit.

1. **D. spiralis**, Hook. f. *Fl. N. Z.* i. 272. Culms 1–3 ft. high, leafy at the base, glabrous, surmounted by a sort of malformed interrupted catkin, bearing long squarrose leafy wiry bracts, with decurrent bases. Leaves very numerous, concave, keeled, 3-gonous towards the long harsh points; margins cutting with minute teeth. Inflorescence a span long. Spikelets  $\frac{1}{2}$  in. long. Glumes concave, striated, obovate, obtuse, shining. Nut quite smooth, broadly obovate, obtuse.—*Anthrophyllum Urvillei*, Steud. Synops. Pl. Cyp. 160; *Isolepis spiralis*, A. Rich. *Fl.* 105. t. 19.

**Northern and Middle Islands**, *Banks and Solander*, etc., not uncommon in sandy seashores, as far south as Canterbury.

8. **FIMBRISTYLIS**, Vahl.

Culms tufted, usually rather soft, nearly terete or 3-gonous, generally leafy below. Leaves grasslike.—Spikelets usually in terminal involucrate corymbose or umbellate panicles, terete or angled. Glumes numerous, mostly floriferous, imbricated all round the rachis. Bristles 3. Stamen 1. Nut surmounted with the tuberos pilose or villous persistent base of the deciduous style. Stigmas 2 or 3.

A large tropical genus, rare in temperate climates.

1. **F. dichotoma**, Vahl.—*F. velata*, Fl. N. Z. i. 272, not Br. Culms densely tufted, annual, slender, leafy at the base, 4–8 in. high. Leaves very slender, shorter than the culms, flaccid, terete, grooved. Umbels with very many slender rays 1–2 in. long, surrounded with long involucre leaves. Spikelets  $\frac{1}{2}$ – $\frac{1}{3}$  in. long, 3–5 on each ray, pedicelled or sessile, ovoid, pale-brown. Glumes numerous, spreading, narrow-lanceolate, acuminate; keel scabrid. Stamen 1. Nut nearly orbicular, compressed, margins thickened, crowned with the bulbous base of the style, from which long hairs descend over its face. Stigmas 2.

**Northern Island**: Bay of Islands, Auckland, etc., *Colenso, Sinclair*. A common Australian tropical and subtropical weed, perhaps introduced into New Zealand.

9. **CLADIUM**, Linn.

Tufted, rigid sedges, of various habit. Culms leafy or leafless, erect, slender or stout, flat terete angled or compressed.—Spikelets generally panicked, often with leafy or spathaceous bracts, small, terete, 1–3-flowered. Glumes few, imbricated all round the rachis, mostly empty. Bristles or hypogynous scales



0. Stamens 3; filaments rarely lengthening after flowering. Nut 3-gonous, usually terminated by the persistent, much enlarged base of the style, but triquetrous and cuspidate in *C. Sinclairii*. Stigmas 2 or 3.

A large and widely diffused genus, especially in tropical countries and temperate Australia; rarer in the north temperate hemisphere. The species differ from *Gahnia* more in habit than in any floral character.

*Culms and leaves terete. Filaments not elongating. Nut with a tumid top.*

- |   |                             |
|---|-----------------------------|
| Culms leafy. Bracts spathaceous. Glumes acuminate . . . . .             | 1. <i>C. glomeratum</i> .   |
| Culms leafy. Bracts small. Glumes awned . . . . .                       | 2. <i>C. teretifolium</i> . |
| Culms leafy. Pith jointed. Panicle very large . . . . .                 | 3. <i>C. articulatum</i> .  |
| Culms leafy. Panicle very long, slender. Spikelets 1-flowered . . . . . | 4. <i>C. Gunnii</i> .       |
| Culms leafless. Sheaths very long, with small flattened tips . . . . .  | 5. <i>C. junceum</i> .      |

*Culms and leaves flat. Filaments elongating. Nut with a 3-quetrous cuspidate top . . . . .* 6. *C. Sinclairii*.

1. ***C. glomeratum*, Br.**;—*Fl. N. Z.* i. 275. Culms stout, tufted, 1–2 ft. high, glabrous, terete, soft, leafy; pith not jointed internally. Leaves terete, subulate. Panicle contracted, distantly much or sparingly branched, 2–6 in. long; bracts large, membranous, spathaceous, lower 1–2 in. long. Spikelets very numerous, fascicled,  $\frac{1}{8}$  in. long. Glumes red-brown, ovate, acuminate, ciliate, glabrous at the back. Nut 3-gonous, polished; top very large, tumid, acute, puberulous.—*Puirena rubiginosa*, Sprengel.

**Northern and Middle Islands**: clayey and marshy places, frequent, *Banks and Solander*, etc. A common Australian and Tasmanian plant.

2. ***C. teretifolium*, Br.**;—*Fl. N. Z.* i. 276. Habit, size, and foliage of *C. glomeratum*, but panicle shorter, 2–4 in. long, much more dense; primary branches shorter and closer together; bracts short, not spathaceous; glumes awned; nut corky, longitudinally grooved and wrinkled.

**Northern Island**: common in marshy places, *Banks and Solander*, etc. **Middle Island**: Canterbury, *Sinclair and Haast*. This is identical with *C. teretifolium* of Sieber's 'Agrostotheca,' No. 6 (*C. rigidifolium*, Presl, according to Steudel, Synops. Cyp. 152); it is a native of New South Wales.

3. ***C. articulatum*, Br.**;—*Fl. N. Z.* i. 276. Culms tufted, erect, 3–5 ft. high, very stout, terete; pith jointed internally. Leaves shorter than the culms, terete, pungent; pith jointed like the culms. Panicle very large, lax, effuse, 6–10 in. long, drooping; branches long. Bracts short compared with the panicles. Spikelets very numerous, pale-brown,  $\frac{1}{8}$  in. long, 3- or 4-flowered. Glumes ovate-lanceolate, acute or very shortly awned, puberulous. Nut unripe, smooth with a large tumid top. Stigmas 2 or 3.

**Northern Island**: Lake Rotoetara, *Colenso*; Auckland, *Sinclair*. Also found in Australia and the Pacific Islands.

4. ***C. Gunnii*, Hook. f.**—*Lampocarya tenax*, *Fl. N. Z.* i. 277. Culms tufted, very slender, 2–4 ft. high, terete, leafy at the base, compressed or grooved towards the top. Leaves like the culms, with pungent, subulate points; sheaths long, narrow, red. Panicle very long, lax, slender, 6–24 in. long; branches few, distant, very slender, few-flowered. Spikelets few, alternate, not crowded or fascicled,  $\frac{1}{8}$  in. long, 1-flowered. Glumes few, all long, lanceolate-subulate, very acuminate; upper awned, much larger, divaricating in fruit. Nut pedicelled, turgid, 3-ribbed, glabrous; top large, tumid. (Described chiefly from Australian specimens.)—*Fl. Tasm.* ii. 95, 148 B.



**Northern Island** : Opurago and Otago, *Banks and Solander* ; Bay of Islands, *Cunningham* ; Auckland, *Sinclair*. This is clearly the Australian plant, though the panicle is very much longer than in my Tasmanian specimens, being quite like Mueller's Victorian.

5. **C. junceum**, Br.—*Lepidosperma striata*, Fl. N. Z. i. 279, not Br. Culms  $\frac{1}{2}$ –2 ft. high, densely tufted, rigid, rising from a woody scaly rhizome, terete, leafless, covered with a long appressed sheath ; tip of the latter vertically flattened, sickle-shaped. Spikelets in a very short, simple or sparingly-branched, few-flowered spike,  $\frac{1}{2}$ –1 in. long, 1-flowered ; bracts small, obtuse, appressed. Glumes oblong-lanceolate, acuminate or awned, scaberrulous at the back. Nut 3-gonous, obovoid ; top tumid, hemispherical, puberulous.

**Northern Island** : abundant in fresh and brackish water marshes, etc., *Banks and Solander*, etc. Also a native of Australia and Tasmania.

6. **C. Sinclairii**, Hook. f.—*Vincentia anceps*, Hook. f. Fl. N. Z. i. 276. Culms tall, coarse, several ft. high, quite flat,  $\frac{1}{4}$  in. broad, smooth. Leaves quite flat, striate, 1 in. broad ; edges sharp but not cutting. Panicle 1 ft. long, soft, excessively branched, nodding ; bracts sheathing ; branches drooping, arising from smaller bracts. Spikelets small, fascicled, pale-brown, 2- or 3-flowered. Lower glumes and bracts awned, striated, scaberrulous. Flowers about 3, of which 1 only seems to ripen fruit. Stamens elongating greatly after flowering. Nut attenuated at both ends ; sharply 3-angled at the cuspidate top, crustaceous, mottled with red, pedicel with a tuberos base.

**Northern Island** : in swamps, *Banks and Solander* ; east coast and interior, *Colenso* ; Auckland, *Sinclair* ; Mercury Bay, *Jolliffe*. I have referred this to *Cladium*, into which the genera *Baumea*, *Chapelliera*, and *Vincentia* must fall. There being a *Cladium anceps* renders it necessary to change the specific name of this.

## 10. GAHNIA, Forst.

(Including LAMPOCARYA, Br.)

Tall, coarse, leafy, rigid, scabrid sedges. Culm erect, terete or 3-gonous, stout. Leaves very long, involute, harsh and cutting, with scabrid edges and points.—Spikelets excessively numerous, small, terete, 1- or 2-flowered, disposed in a terminal branched, often effuse panicle. Glumes few, imbricated all round the rachis, the terminal (or last 2) minute, floriferous. Bristles and hypogynous scales 0. Stamens 3, 4, or 6 ; filaments usually lengthening much after flowering, and often twisting together and holding the nut suspended. Nut very hard, obscurely 3-gonous, sessile, obscurely thickened at the top. Stigmas 3 or 4, sometimes 2-fid.

A small genus, native of Australia, Tasmania, and the Malayan and Pacific Islands. Closely allied to *Cladium*, but very different in their more harsh habit and foliage.

*Nut of stony hardness, transversely grooved inside. Stamens 4.*

Spikelets black,  $\frac{1}{4}$  in. long. Nut pale red-brown . . . . . 1. *G. setifolia*.  
Spikelets red-brown,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Nut pale-brown . . . . . 2. *G. procera*.

*Nut not transversely grooved internally. Stamens 3 or 4. (Lampocarya, Br.)*

Leaves with very slender points. Stamens 4. Nut black . . . . . 3. *G. lacera*.  
Panicle 2–3 ft. long. Branches very long, pendulous. Stamens 4.

Nut yellow . . . . . 4. *G. xanthocarpa*.  
Culms robust, angled, scabrous. Stamens 3. Nut black . . . . . 5. *G. arenaria*.

1. **G. setifolia**, *Hook. f. Fl. N. Z.* i. 279. A very large, tall, coarse, cutting sedge, 2–6 ft. high, forming huge tussocks in woods. Culms erect, terete, as thick as a goose-quill. Leaves very long, convolute, with cutting edges and long scabrid points. Panicle 1–2 ft. long, much laxly branched, very slender; bracts leafy, with long black sheaths. Spikelets pedicelled, ovoid, nearly  $\frac{1}{4}$  in. long, 2-flowered. Glumes coriaceous, short, black-brown; outer downy, awned; inner acuminate. Upper flower perfect, lower male. Stamens 4; filaments lengthening much after flowering. Nut  $\frac{1}{4}$  in. long, narrow elliptic-oblong, acute at both ends, when ripe red-brown, polished, grooved on one side, transversely furrowed within.—*Lampocarya setifolia*, A. Rich.

**Northern** Island: abundant in woods, *Banks and Solander*, etc. **Middle** Island: Nelson, *Travers* (panicle broader, excessively branched; nut smaller). Very near the Tasmanian *G. psittacorum*.

2. **G. procera**, *Forst.*;—*Fl. N. Z.* i. 278. Habit and foliage of *G. setifolia*, but smaller. Culms only 2–3 ft. high; panicle more slender, with fewer, shorter branches; bracts more spathaceous; spikelets much larger, on longer pedicels. Spikelets  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, of a dark purple-brown colour. Glumes coriaceous, few; outer longer than the spikelet, acuminate and awned. Stamens 4; filaments very long. Nut pale-brown, scarcely shining (perhaps not ripe), transversely grooved within.

**Middle** Island: Dusky Bay, *Forster*; Port Preservation, *Lyall*.

3. **G. lacera**, *Stendel*.—*Lampocarya lacera*, A. Rich.;—*Fl. N. Z.* i. 277. A tall, coarse, harsh, densely-tufted sedge, 3–5 ft. high. Culms stout, leafy, as thick as a goose-quill. Leaves very long, involute, with cutting edges and long scabrid points. Panicle erect or inclined, 1–1 $\frac{1}{2}$  ft. long, much branched, leafy. Spikelets alternate, pedicelled, pale-brown. Glumes membranous, downy, ovate, acuminate, awned,  $\frac{1}{8}$ – $\frac{1}{5}$  in. long. Stamens 4; filaments much elongating. Nut  $\frac{1}{8}$  in. long, elliptic-oblong, black, shining, obscurely 3-gonous, not transversely furrowed within.

**Northern** and **Middle** Islands: abundant in woods, *Banks and Solander*, etc.

4. **G. xanthocarpa**, *Hook. f.*—*Lampocarya xanthocarpa*, *Fl. N. Z.* i. 278. A very stout, tall, densely-tufted, harsh, leafy sedge. Culms robust, 4–6 ft. high, as thick as the little finger. Leaves very long, involute, with scabrid, cutting edges. Panicle leafy, 2–3 ft. long, with numerous very long, pendulous and flexuous branches, a span long. Spikelets alternate, pedicelled,  $\frac{1}{5}$ – $\frac{1}{6}$  in. long, dark-brown. Glumes rather coriaceous; outer ovate, awned; inner acute. Stamens 4; filaments much elongating. Nut  $\frac{1}{8}$  in. long, unripe pale-yellow, not transversely furrowed within.

**Northern** Island: east coast, *Banks and Solander*; Auckland, *Sinclair*; interior, *Colenso*. A noble plant.

5. **G. arenaria**, *Hook. f.*—*Lampocarya affinis*, Brong.;—*Fl. N. Z.* i. 277. A densely-tufted, harsh, very leafy, subsquarrose sedge. Culm leafy, 1–1 $\frac{1}{2}$  ft. high, obtusely 3-gonous, scabrous. Leaves excessively numerous, much longer than the culms, narrow, involute, scabrid; sheaths very short. Panicle erect, leafy, rigid; branches distant, very short; bracts ex-

cessively long and foliaceous. Spikelets in dense ovoid fascicles,  $\frac{1}{2}$ –1 in. long, narrow-lanceolate, very shortly pedicelled, turgid. Glumes rather coriaceous, obscurely distichous, very concave, ovate-lanceolate, acuminate, all awned, lower shorter. Stamens 3, filaments scarcely lengthening after flowering. Nut elliptic-oblong, subacute, black, polished, obscurely 3-gonous, not transversely grooved within.—*Morelotia Gahniæformis*, Gaudichaud, in Freyc. Voy. 416. f. 28.

**Northern** and **Middle** Island: common on hills, sandy shores, etc.; *Banks and Solander*, etc. Very near a Sandwich Island species.

## 11. LEPIDOSPERMA, Labill.

Culms tufted, erect, from a stout creeping rhizome, very rigid, compressed terete angled or flat and leaf-like, with cutting edges, leafy at the base only. Leaves usually equitant, rigid, cutting.—Spikelets small, in rigid branched compressed spikes or panicles, 1- or 2-flowered, with an awned bract at the base. Glumes few, imbricating all round the rachis, brown, rigidly coriaceous, the upper 1 or 2 floriferous, lower flower alone fertile. Stamens 3. Hypogynous scales 6, thick, very small, adnate to the base of the nut. Nut coriaceous or osseous, terminated by the base of the style.

A very large Australian and Tasmanian genus, of which a few species are found in New Zealand and the Malay Islands, China, and Ceylon.

Culms and leaves 3- or 4-angled . . . . . 1. *L. tetragona*.  
Culms and leaves flat . . . . . 2. *L. concava*.

1. ***L. tetragona***, Labill. *Fl. Nov. Holl. t.* 17.—*L. australis*, Hook. f. *Fl. N. Z. i.* 279. Culms tufted, 1–1½ ft. high, irregularly 3- or 4-angled, very rigid, smooth. Leaves rigid, 2–8 in. long, 3- or 4-angled. Spikelets crowded, forming a short, oblong, terminal head  $\frac{1}{2}$  in. long; bract short, sheathing, with a subulate erect point. Spikelets nearly  $\frac{1}{4}$  in. long. Glumes 6–8, very coriaceous, acuminate, lower awned, terminal floriferous. Stamens and stigmas 3. Scales connate into a small 6-lobed cup. Nut with a tumid top.—*Vauthiera australis*, A. Rich. *Fl.* 107. t. 20.

**Northern** Island: banks of lakes, etc., common, *Banks and Solander*, etc. **Middle** Island: Nelson, *Sinclair*; Akaroa, *Raoul*. A native of Australia and Tasmania.

2. ***L. concava***, Br.—*L. longitudinalis*, Hook. f. *Fl. N. Z. i.* 279, not Labill. Culms flat, 3–4 ft. high,  $\frac{1}{4}$ – $\frac{1}{5}$  in. broad, with scabrid cutting edges, thin, concave on one side. Leaves flat like the culms, acuminate. Panicle erect, rigid, sparingly branched, 2–3 in. long; branches distant; bract acute, spathaceous. Spikelets few, short, in appressed fascicles of 2 or 3 within an awned bract, 1-flowered. Glumes ovate, puberulous, rough on the back, awned. Stamens 3. Scales minute, connate. Nut obovate, terminated by the tumid base of the style.—*Fl. Tasm. i.* 91. t. 146 B; *L. elatior*, A. Cunn. not Br.

**Northern** Island: not uncommon in clay hills and Bay of Islands, *Cunningham*; Auckland, *Sinclair*. A native of Australia and Tasmania.

## 12. OREOBOLUS, Br.

A low, rigid, densely tufted plant, forming large cushion-like patches on the mountains. Culms short, densely compacted, leafy throughout, divided. Leaves subulate, distichous or imbricated all round.—Scape axillary, short, compressed, 1-flowered, strict, rigid, lengthening after flowering. Glumes 2, deciduous. Hypogynous scales 6, in 2 series, perianth-like, persistent. Stamens 3. Style deciduous, bulbous at the base; stigmas 3. Nut enveloped above the middle in the appressed scales, crustaceous, obovoid, 3-gonous, with a broad, terminal, depressed area.

A remarkable genus, confined to the alps of Tasmania, Australia, New Zealand, and Fuegia.

1. **O. Pumilio**, Br.—*O. pectinatus*, Hook. f. Fl. N. Z. i. 275. Culms 1–3 in. long, usually flattened. Leaves closely densely imbricated, distichous and spreading, or suberect and imbricating all round, curved, linear subulate,  $\frac{1}{2}$ –1 in. long, pungent; sheaths hard, striated. Spikelets minute. Scape an inch long after flowering. Glumes lanceolate,  $\frac{1}{4}$  in. long. Scales lanceolate subulate.—*O. pectinatus*, Fl. Antart. i. 87. t. 49.

**Northern** Island: mountainous regions, Taupo plains, and tops of the Ruahine range, Colenso. **Middle** Island: Morses mountain, alt. 6000 ft., Bidwill; Southern Alps, Haast. **Lord Auckland's** group and **Campbell's** Island, abundant, J. D. H. Found also in the Tasmanian and Victorian Alps.

## 13. UNCINIA, Persoon.

Tufted, usually grass-like sedges, with fibrous roots. Culms stout or slender, more or less 3-gonous. Leaves long, narrow, flat, involute or keeled.—Spikelet solitary at the end of the culm, linear-elongate, terete, many-flowered, upper part contracted, male. Glumes imbricated all round the rachis, all floriferous; upper *male* with 3 stamens, and no rudiment of scales or ovary; lower *female*; ovary contained in a compressed urceolate utricule (*perigynium* of authors); its style and 3 stigmas exerted; a long rigid exerted bristle, hooked at the tip, arises from the base of the ovary, also within the utricule. Nut 3-gonous, flattened, included in the utricule.

A considerable genus, native of Tasmania, Australia, New Zealand, Tristan d'Acunha, Abyssinia, Fuegia, and the Andes of S. America. The species have been elaborated by the late Dr. Boott for the 'New Zealand Flora,' which descriptions have in great part been embodied in the following pages. The New Zealand forms are most puzzling, *U. leptostachya*, *Banksii*, *Sinclairii*, *rubra*, and *ferruginea*, seem all very distinct, the rest are very difficult of discrimination.

*Utricle scabrous towards the top.*

Culms slender. Bract subulate or 0. Spikelet very slender . . . 1. *U. leptostachya*.  
Culms short, stout. Bract subulate. Spikelet short, stout . . . 2. *U. Sinclairii*.

*Utricle perfectly smooth. Glumes closely imbricate.*

Culms short. Spikelet  $\frac{1}{4}$ – $\frac{3}{4}$  in. Bract 0 . . . 3. *U. compacta*.  
Culms long. Spikelet 3–6 in. Bract leafy. Glumes  $\frac{1}{10}$  in. . . 4. *U. australis*.  
Culms long. Spikelet 3–6 in. Bract leafy. Glumes  $\frac{3}{8}$ – $\frac{1}{2}$  in. . . 5. *U. ferruginea*.

*Utricle perfectly smooth. Glumes lax, all or the lower distant.*

Leaves longer than culm, green when dry.

Leaves  $\frac{1}{4}$ – $\frac{1}{10}$  in. broad. Spikelets 2–4 in. Bract leafy . . . 6. *U. cæspitosa*.



Leaves $\frac{1}{10}$ — $\frac{1}{8}$ in. broad. Spikelets 1–2 in. Bract 0. Glumes equalling utricle . . . . .	7. <i>U. rupestris</i> .
Leaves $\frac{1}{10}$ — $\frac{1}{30}$ in. broad. Spikelets $\frac{3}{4}$ – $1\frac{1}{2}$ in. Bract 0. Glumes equalling utricle . . . . .	8. <i>U. filiformis</i> .
Leaves $\frac{1}{10}$ — $\frac{1}{30}$ in. broad. Spikelets 2–3 in. Bract 0. Glumes $\frac{1}{2}$ as long as utricle . . . . .	9. <i>U. Banksii</i> .
Leaves shorter than culm, red when dry . . . . .	10. <i>U. rubra</i> .

1. **U. leptostachya**, *Raoul, Choix*, 12. t. 5;—*Fl. N. Z.* i. 286. Culms filiform, scaberulous upwards, 1–2 ft. long. Leaves longer than the culms, narrow,  $\frac{1}{12}$  in. broad. Spikelet  $1\frac{1}{2}$ –4 in. long, very slender, lax-flowered, upper male part filiform; bract setaceous. Glumes small, distant, ovate or subulate-lanceolate, acute or obtuse, membranous. Utricle about as long as the glume, fusiform, nearly  $\frac{1}{4}$  in. long, scabrid above, margins ciliate, faintly nerved.

Var.  $\beta$ . *distans*. Spikelet 1–2 in. long. Utricles as long as the acuminate glumes.—*U. distans*, Boott, *Fl. N. Z.* i. 285.

Var.  $\gamma$ . *scabra*. Spikelets 1–2 in. long. Utricle longer than the acute glumes.—*U. scabra*, Boott, *Fl. N. Z.* i. 286.

**Northern and Middle Islands**: probably common; top of the Ruahine range and Titikura, *Colenso*; Akaroa, *Raoul*. I can hardly distinguish the above varieties as such.

2. **U. Sinclairii**, *Boott, mss.* Culms 4–8 in. high, stout, smooth. Leaves flat, grassy,  $\frac{1}{10}$  in. broad, shorter than the culm. Spikelet  $\frac{3}{4}$ –1 in.; long, robust; male portion very short, narrow, cylindric; bract 0. Glumes imbricate, broadly ovate-oblong, obtuse, green with white membranous margins. Utricle longer than the glumes,  $\frac{1}{4}$  in. long, narrow obovate-lanceolate, 3-gonous, scabrous above, edges ciliate; style tumid at the base.

**Middle Island**: Tarndale?, *Sinclair*; Lake Tennyson, alt. 4400 ft., *Travers*.

3. **U. compacta**, *Br.*; var. *divaricata*.—*U. divaricata*, Boott;—*Fl. N. Z.* i. 286. Culms short, stout, 4–6 in. high, smooth. Leaves much longer than the culms, flat,  $\frac{1}{12}$ – $\frac{1}{6}$  in. broad, rigid. Spikelet short,  $\frac{1}{2}$ – $\frac{3}{4}$  in., rather stout,  $\frac{1}{4}$  in. diam., upper  $\frac{1}{4}$  male; bract 0. Glumes closely imbricate, lanceolate, acute, deciduous, pale, the lower cuspidate. Utricle  $\frac{1}{6}$  in. long, rather turgid, lanceolate, quite glabrous, spreading when old; bristle incurved, as long, stout.

**Northern Island**: top of the Ruahine range, *Colenso*. **Middle Island**: Milford Sound, *Lyall*. This differs from the Tasmanian plant only in the pale-green, not brown, glumes; it is also near the *U. Kingii* of *Nuegia*.

4. **U. australis**, *Persoon*;—*Fl. N. Z.* i. 287. Culms 6–12 in. high, rigid, smooth. Leaves very numerous, twice as long as the culm, flat,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad, smooth or scabrid. Spikelet 3–6 in. long, cylindrical,  $\frac{1}{6}$  in. broad, upper  $\frac{1}{3}$  or  $\frac{1}{4}$  slender male; bract long, foliaceous. Glumes closely imbricating, ovate, subacute,  $\frac{1}{10}$  in. long, pale-green, faintly browned. Utricle as long as or shorter than the glume, elliptical-oblong, or fusiform and turgid in the middle, equally narrowed at both ends.—*U. compacta*, A. Rich., not Br.; *Carex uncinata*, Forst.

**Northern and Middle Islands**: common in woods.

5. **U. ferruginea**, *Boott. in Fl. N. Z.* i. 388. t. 64 B. Very similar in habit, stature, and dimensions, to *U. australis*, but the glumes are much

longer,  $\frac{1}{8}$ – $\frac{1}{3}$  in. long, subulate-lanceolate, long acuminate, dark-brown with green keel, and the utricle is more attenuate upwards, and less at the base.

**Northern Island:** sides of streams, base of Ruahine range, *Colenso*; Wellington, *Ralphs*.

6. ***U. cæspitosa***, *Boott*, in *Fl. N. Z.* i. 287. Culms 6–12 in. high, rather stout. Leaves much longer than the culms, slender,  $\frac{1}{4}$ – $\frac{1}{6}$  in. broad, flat or 3-gonous, rather scabrid. Spikelet 1–4 in. long, rather stout; bract leafy. Glumes rather close, lower remote, lanceolate, obtuse acute or acuminate, pale-green. Utricle as long as the glume, narrow ovate or fusiform, narrowed at both ends, 3-nerved.

**Northern Island:** frequent in mountainous districts, *Colenso*, etc. A very variable plant, small forms, with narrow leaves and small spikelet, are seen to pass into *U. filiformis*, others with broader leaves run into *U. rupestris*, and the large form with foliaceous bracts into *U. australis*.

7. ***U. rupestris***, *Raoul*, *Choix*, 13. t. 5;—*Fl. N. Z.* i. 286. Culms slender, 3–6 in. high. Leaves very much longer than the culm, flat,  $\frac{1}{16}$ – $\frac{1}{10}$  in. broad, nearly smooth. Spikelet small, slender, 1–2 in. long; bract setaceous or 0. Glumes very laxly imbricate,  $\frac{1}{8}$  in. long, narrow oblong-lanceolate, obtuse or acuminate, pale-brown. Utricle about as long as the glume, very narrow-ovate or fusiform, attenuate upwards, 3-nerved.—*U. Hookeri*, *Boott*, in *Fl. Antart.* i. 91. t. 51; *U. riparia*, *Hook. f.* in *Hook. Journ. Bot.* iii. 417, not *Br.*

**Northern Island:** Wellington, *Stephenson*. **Middle Island:** Akaroa, *Raoul*; Canterbury, *Travers*. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* Extremely near the Tasmanian *U. riparia*, *Br.*, and perhaps only a form of that plant.

8. ***U. filiformis***, *Boott*, in *Fl. N. Z.* i. 286. Culm extremely slender, 4–10 in. high. Leaves filiform, much longer than the culm,  $\frac{1}{40}$ – $\frac{1}{30}$  in. broad, 3-gonous, grooved, scabrid. Spikelets filiform,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. long; bract 0. Glumes approximate,  $\frac{1}{8}$  in. long, lanceolate, acuminate, pale-green. Utricle as long as the glumes, lanceolate, 3-nerved.

**Northern Island:** top of the Ruahine mountains, *Colenso*. **Middle Island,** *Lyall*.

9. ***U. Banksii***, *Boott*, in *Fl. N. Z.* i. 287. Habit and foliage of *U. filiformis*, but the spikelets are 2–3 in. long, male portion sometimes female at the top, the glumes distant, short, not half the length of the slender, almost terete, 3-nerved utricle.

**Northern and Middle Islands:** not uncommon in damp woods, *Banks and Solander*, etc.

10. ***U. rubra***, *Boott*, in *Fl. N. Z.* i. 287. t. 64 A. Whole plant red-brown when dry. Culms rigid, 6–12 in. high, scabrid above. Leaves shorter than the culm, rigid, long, striate, concave,  $\frac{1}{16}$ – $\frac{1}{12}$  in. broad. Spikelet rigid, 1–2 in. long, male portion short, of few glumes; bract 0. Glumes few, distant, ovate-lanceolate, obtuse or acute, concave, rigid, persistent. Utricle as long as or shorter than the glume, oblong-lanceolate, terete, faintly nerved.

**Northern Island:** east coast, *Tehawera*, and summit of *Titiokura*, *Colenso*.

#### 14. **CAREX**, Linn.

†Tufted, usually grass-like sedges, with creeping rhizomes and fibrous roots.

Culms stout or slender, obtusely or acutely 3-gonous. Leaves long, narrow, flat involute or keeled.—Spikelets solitary or numerous, simple or compound, usually arising from the sheaths of long, leafy bracts, unisexual or bisexual, oblong or linear, terete, many-flowered. Glumes imbricated all round the rachis, entire or 2-fid, obtuse cuspidate or awned, all floriferous. *Male* fl: stamens 3; ovary 0. *Female*: an ovary contained in a sessile or stalked, urceolate, compressed utricle (*perigynium* of authors); style exserted; stigmas 2 or 3. Nut 3-gonous or flattened, included in the utricle, rarely accompanied with a slender bristle which is not hooked at the tip.

An immense genus, found in all parts of the world, but especially in mountainous regions; it has been a subject of special study by my friend the late Dr. Boott, F.L.S., who prepared the descriptions of the New Zealand species (and of *Uncinia*) for the 'New Zealand Flora.' On re-examining the specimens with additional ones received since, for the present work, I have found it necessary to unite *C. fascicularis*, Soland., with *C. Forsteri*, Wahl., and *C. secta*, Boott, with *C. virgata*, Soland.; and *C. Lambertiana*, and perhaps *vacillans* should also be united with *C. dissita*, Soland. There are, no doubt, many other species to be found in New Zealand; in the Middle Island they have been scarcely at all collected.

A. *Spikelet solitary, simple, small; upper part male. Stigmas usually 3.*

Culms 3-6 in., shorter than the flat leaves. . . . . 1. *C. pyrenaica*.

Culms 2-6 in., and leaves wiry, terete, grooved . . . . . 2. *C. acicularis*.

B. *Spikelets collected into a solitary compound spike, small, androgynous. Stigmas 2.*

*Spikelets with male flowers below.*

Leaves flattish. Spikelets 1-3, pale. Utricle ovate, beaked, serrate above . . . . . 3. *C. inversa*.

Leaves involute, wiry. Spikelets 1-4, brown. Utricle broad, not beaked, serrate above . . . . . 4. *C. Colensoi*.

Leaves keeled. Spikelets many, squarrose. Utricle spreading, longer than the glume . . . . . 5. *C. stellulata*.

*Spikelets with male flowers above. (Utricle with serrate wings above.)*

Culm 1-2 ft., slender. Spike short. Utricle as long as glume . . . . . 6. *C. teretiuscula*.

Leaves 1-3 ft.,  $\frac{1}{8}$  in. diam., harsh. Spike very long and slender . . . . . 7. *C. virgata*.

Leaves 1-3 ft.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. diam., harsh. Spike very long and stout . . . . . 8. *C. appressa*.

C. *Spikelets several, distinct, axillary, in long leafy bracts, usually peduncled.*

a. *Spikelets all unisexual, or the female with a few male flowers at top. Stigmas 2.*  
(Utricle not serrate above in any.)

Spikelets 3-6, peduncled, erect. Glumes obtuse, smaller than the flat utricle . . . . . 9. *C. Gaudichaudiana*.

Spikelets 5-7, peduncled, erect. Glumes mucronate or cuspidate, smaller than the flat utricle . . . . . 10. *C. subdola*.

Spikelets 15-24, peduncled, long, pendulous, brown. Glume awned . . . . . 11. *C. ternaria*.

Spikelets 4, sessile, short, pale. Glumes cuspidate. Utricle shining . . . . . 12. *C. testacea*.

B. *Spikelets all unisexual, or the females with male flowers below. Glumes cuspidate.*  
*Stigmas 2, rarely 3 in C. lucida.*

Spikelets 4-6, approximate, sessile, short . . . . . 13. *C. Raoulii*.

Spikelets 4-8, distant, peduncled, cylindric . . . . . 14. *C. lucida*.

γ. *Spikelets unisexual, or the females with a few male flowers above or below. Stigmas 3.*

† *Utricles spreading after flowering, glabrous.*

Culm shorter than leaves. Spikelets short, crowded, brown . . . . . 15. *C. pumila*.

Culm tall, leafy. Spikelets cylindric, large, green . . . . . 16. *C. Forsteri*.

Culms short, leafy. Spikelets short, obtuse, green . . . . . 17. *C. cataractæ*.  
 †† *Utricles erect, pubescent. Culms short* . . . . . 18. *C. breviculmis*.

††† *Utricles erect, glabrous. Culms slender (except in C. trifida), long*.

Spikelets 6-10, stout, very large, brown, 2-4 in. Glumes 2-fid. 19. *C. trifida*.

Spikelets 6-10, slender, pedicelled,  $\frac{3}{4}$ - $\frac{1}{2}$  in. Glumes entire . . . 20. *C. Neesiana*.

Spikelets 5-8, stout, suberect,  $\frac{1}{2}$ -1 in. Glume 2-fid . . . . . 21. *C. dissita*.

Spikelets 5-8, stout, suberect, 1-1 $\frac{1}{2}$  in. Glumes 2-fid . . . . . 22. *C. Lambertiana*.

Spikelets 5-9, drooping, 1-2 $\frac{1}{2}$  in. Glumes entire . . . . . 23. *C. vacillans*.

1. ***C. pyrenaica***, *Wahlenberg*;—*Fl. N. Z.* i. 280. Culms small, 3-6 in. high, 3-gonous, quite glabrous. Leaves flexuous, longer than the culm, coriaceous, flat, grooved below, edges scabrid. Spikelet terminal, solitary,  $\frac{1}{3}$ - $\frac{3}{4}$  in. long, linear-ovoid, pale red-brown; male flowers at the top. Glumes ovate, acuminate or obtuse. Utricle longer and narrower than the glume, stipitate, lanceolate, compressed, nerveless; beak pale, membranous, emarginate. Stigmas 3, rarely 2.

**Northern Island**: tops of the Ruahine mountains, forming clumps in snow runs, *Colenso*. A native of Europe and North America.

2. ***C. acicularis***, *Boott*;—*Fl. N. Z.* i. 280. *t.* 63 C. Culms small, 2-6 in. high, rigid, wiry, very slender, nearly terete. Leaves as narrow as the culm, nearly terete, grooved in front, quite smooth. Spikelet solitary, ovoid,  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, pale red-brown; male flowers at the top; bract long or short. Glumes few, lanceolate, acuminate, lower foliaceous; utricle stipitate, lanceolate, 3-quetrous, acuminate; edges serrate above; beak 2-fid. Nut 3-gonous, with a linear bristle at its side. Stigmas 3.

**Northern Island**: tops of the Ruahine range, *Colenso*.

3. ***C. inversa***, *Br.*;—*Fl. N. Z.* i. 281. Small, rather slender, 1-10 in. high, quite smooth. Rhizome stout, creeping. Culms leafy below only, slender, 3-gonous, grooved. Leaves shorter, flat, keeled, very narrow,  $\frac{1}{2}$ - $\frac{1}{6}$  in. broad. Spikelets solitary, or broken up into 2 or 3,  $\frac{1}{2}$ - $\frac{1}{4}$  in. long, ovoid, pale; male flowers below; bracts very long, unequal. Glumes ovate, acuminate, cuspidate or awned. Utricle as long as the glume, oval, beaked, nerved, margins serrate above. Stigmas 2.

**Northern Island**: Hawke's Bay and Ruahine range, *Colenso*. Also a native of Tasmania and Southern Australia.

4. ***C. Colensoi***, *Boott*;—*Fl. N. Z.* i. 281. *t.* 63 B. Small, slender, wiry, flexuous, 6-12 in. high; rhizome stout, creeping. Culms leafy at the base only, very slender, 3-gonous, grooved. Leaves longer or shorter, as narrow as the culms, involute, deeply grooved. Spikelets solitary or broken up into 2-5, ovoid, turgid,  $\frac{1}{4}$  in. long; male flowers below; bracteate or not. Glumes ovate, acuminate, pale-brown; margins broad, white. Utricle shorter and narrower than the glumes, broadly ovate or oblong, not beaked, obscurely nerved; margins serrulate above. Stigmas 2.

**Northern Island**: dry plains, road from Patangata to Manawarakau, *Colenso*. **Middle Island**: Southern Alps, 3000-3500 ft., *Sinclair and Haast*; Acheron valley, 4000 ft., *Travers*.

5. ***C. stellulata***, *Goodenough*;—*Fl. N. Z.* i. 281. Culms very slender, tufted, glabrous, leafy at the base only, 3-gonous, grooved. Leaves as long and narrow as the culms, or broader, flattish or involute, grooved. Spikelets



3 or 4, very small,  $\frac{1}{12}$ – $\frac{1}{10}$  in. long, very few-flowered, divaricating in fruit; male flowers below, uppermost male only; bracts 0. Glumes very few, ovate, acute, keeled, pale; margins broad, membranous. Utricle longer than the glume, ovate, acuminate, 3-gonous, nerved, serrate at the margin, beaked, 2-dentate. Stigmas 2.

**Northern Island:** bogs near Lake Taupo, *Colenso*. **Middle Island:** Acheron valley, 4000 ft., *Travers*. Also found throughout the temperate northern hemisphere, but only in New Zealand in the southern.

6. **C. teretiuscula**, *Goodenough*;—*Fl. N. Z.* i. 281. Culms tall, slender, erect, 1–2 ft. high, 3-quetrous, smooth or scabrid, grooved, leafy at the base only. Leaves shorter and broader than the culms, flat, deeply grooved; margins scabrid. Spikelets very small,  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, collected into a linear head  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, few-flowered; male flowers at the top; bracteate or not. Glumes pale-brown, ovate, acute; margins broad, membranous. Utricle about as long as the glume, ovate, plano-convex, nerved at the back, winged and serrate above; beak 2-dentate. Stigmas 2.

**Northern Island:** bogs, Tangoio village, Hawke's Bay, *Colenso*. **Middle Island:** watercourses near Lake Okau, *Haast*; Otago, lake district, *Hector and Buchanan*. Common throughout the north temperate zone, but not found elsewhere in the southern.

7. **C. virgata**, *Solander*;—*Fl. N. Z.* i. 283. Culms densely tufted, tall, harsh, leafy, 3-gonous, edges scabrid, 1–2 ft. high. Leaves rigid, flat, keeled, narrow,  $\frac{1}{8}$  in. broad, much longer than the culms; margins scabrid. Spikelets very numerous, distantly spiked or panicle along the slender end of the culm, small, sessile,  $\frac{1}{12}$  in. long, pale brown; male flowers at the top. Glumes ovate, acute, cuspidate or awned; margins broadly membranous. Utricle as long as the glume, 2-convex, oblong or broadly ovate; beak short, with serrate wings, obliquely 2-dentate; nerves strong. Stigmas 2.—*Boott*, III. *Carex*, t. 121, 122; *C. collata*, *Boott*, in *Lond. Journ. Bot.* iii. 447.

Var.  $\beta$ . *secta*.—*C. secta*, *Boott*, l. c. 283. Spike more lax slender and drooping. Utricle faintly nerved.—*Boott*, III. *Carex*, t. 123, 124.

**Northern and Middle Islands:** Var.  $\alpha$  and  $\beta$ , common in marshes and bogs, abundant, as far south as Otago, *Colenso*, *Sinclair*, etc. Var.  $\beta$  forms tufts of roots sometimes 1–6 ft. high and 6–18 in. diam., like the stem of a Tree-Fern, *Buchanan*.

8. **C. appressa**, *Br.*;—*Fl. Antarct.* i. 90. A large harsh species, of the same habit and with nearly the same characters as *C. virgata*, but the leaves are upwards of  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad, the culms acutely 3-quetrous, very stout and scabrid, the spike erect, more rigid, with shorter, stouter branches, and the utricles are plano-convex, with incurved margins and nerved faces.—*Boott*, III. *Carex*, t. 119, 120; *Fl. Tasm.* ii. 99.

**Lord Auckland's** group and **Campbell's** Island, abundant in woods near the sea, *J. D. H.* Also a most common Tasmanian and temperate Australian plant. This again I am inclined to regard as a form of *C. virgata*.

9. **C. Gaudichaudiana**, *Kunth*. Culms leafy, tufted, 2 in.–2 ft. high, nearly smooth, rather slender. Leaves shorter than the culms, flat, rather soft. Spikelets 3–6, erect,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, ovoid or cylindric, purple, shortly peduncled or the lower long-peduncled, the lower female or with very few male flowers at the top; bracts long, leafy. Glumes oblong or lanceolate-oblong, obtuse or rounded at the tip, dark-purple with green margin and

keel. Utricle broader and longer than the glume, ovate- or elliptic-lanceolate, compressed, strongly nerved, green, when ripe dotted with brown; beak short, entire or 2-dentate. Stigmas 2.—*Fl. Tasm.* ii. 99. t. 151 A.

**Middle Island:** Southern Alps, *Sinclair and Haast, Travers*; Otago, banks of the Clutha, *Lindsay*; lake district, *Hector and Buchanan*. All *Sinclair's*, *Haast's*, and *Travers's* specimens have an almost wholly unisexual spikelet. *Lindsay's* have male flowers at top. *Buchanan* remarks that it is a most important plant, filling up bogs, etc., and preparing the way for other vegetation. Also a native of South-East Australia and Tasmania.

10. ***C. subdola*, Boott**;—*Fl. N. Z.* i. 282. Very similar in habit and characters to *C. Gaudichaudiana*, but usually taller, 2–3 ft. high, and with the glumes mucronate or shortly aristate.

**Northern Island:** Bay of Islands, *Colenso*, etc. **Middle Island:** Acheron valley, alt. 4000 ft., *Travers*.

11. ***C. ternaria*, Forst.**;—*Fl. N. Z.* i. 282. A large, tall, very leafy species. Culms 2–4 ft. high, stout, leafy throughout; angles very seabrid. Leaves very long, flat,  $\frac{1}{3}$ – $\frac{1}{2}$  in. broad, smooth or seabrid. Spikelets very numerous, cylindric, 1–4 in. long, long-peduncled, nodding or pendulous, solitary or 2- or 3-nate, dark-brown, unisexual or the female with male flowers at top; bracts very long and leafy. Glumes ovate or lanceolate, truncate emarginate or acute, with hispid awns. Utricle shorter than the glume, flattened, broadly ovate- or elliptic-obovate, entire or emarginate, nerved, shortly beaked. Stigmas 2.—*C. polystachya*, A. Rich.; *C. geminata*, Schkuhr.

**Northern Island:** Banks and Solander; Great Barrier Island, *Sinclair*; Wellington, *Stephenson*; Hawke's Bay, *Colenso*. **Middle Island,** abundant. **Lord Auckland's** group, *J. D. H.*

12. ***C. testacea*, Solander**;—*Fl. N. Z.* i. 282. A rather small, perfectly smooth species. Culms 4–10 in. high, very slender, leafy. Leaves as long as or longer than the culms, very narrow, flat,  $\frac{1}{12}$ – $\frac{1}{10}$  in. broad. Spikelets 4, very close together, sessile, shortly cylindric,  $\frac{1}{2}$ –1 in. long, stout, uppermost very slender, male; bracts very long. Glumes broadly ovate, shortly awned, membranous, pale-brown. Utricle as large as the glumes, very broadly ovate, turgid, plano-convex, nerved, shining; beak short, usually broadly 2-euspidate. Stigmas 2.

**Northern Island:** Tigada, *Banks and Solander*; Auckland, *Sinclair*. **Middle Island:** banks of the Clutha, *Lindsay*; Canterbury, *Sinclair and Haast*. Boott, who describes the utricles as serrated above,—but I do not find them so,—informs me that it is possibly a variety of *C. Raoulii*; but the 2-fid glumes of the latter readily distinguish it.

13. ***C. Raoulii*, Boott**;—*Fl. N. Z.* i. 283. Culms 2–3 ft. high, slender, leafy, smooth. Leaves long, narrow,  $\frac{1}{6}$  in. broad, nearly smooth, flat. Spikelets 4–6, pale, close together or the lower distant, sessile, shortly cylindric,  $\frac{1}{2}$ –1 in. long, male flowers below, upper longer with more male flowers below; bracts very long and leafy. Glumes broadly ovate, 2-lobed, with a short hispid awn; margins broadly scarious and laecerate. Utricle as large as the glume, obovate, turgid, plano-convex, purplish, strongly nerved, toothed or entire on the edges above; beak emarginate. Stigmas 2.

**Middle Island:** Akaroa, *Raoul*; Southern Alps, *Sinclair and Haast*.

14. ***C. lucida*, Boott**;—*Fl. N. Z.* i. 283. A rigid, rather harsh, leafy species. Culms slender, leafy all the way up, 1–2 ft. high, slightly seabrid.

Leaves much longer than the culms, very narrow,  $\frac{1}{4}$ – $\frac{1}{10}$  in. broad, rigid, flat or keeled. Spikelets 4–8, distant, erect, cylindric,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long; upper male, more sessile, slender; lower male at the base only. Glumes ovate, acute obtuse or emarginate, cuspidate or shortly awned, pale-purple, shining; keel and margins pale. Utricle as long as the glume, ovate or elliptic, 2-convex, faintly nerved; margin scabrid or smooth, purple; beak short, minutely 2-dentate. Stigmas 2, rarely 3.—Boott, Ill. Carex, t. 173.

**Northern** Island: frequent in grassy places, *Banks and Solander*, etc. **Middle** Island: Upper Wairau, *Sinclair, Travers*; Dunedin, *Lindsay*.

15. **C. pumila**, *Thunberg*;—*C. littorea*, Labill. Fl. Nov. Holl. ii. t. 219; Fl. N. Z. i. 284. A harsh, short, rigid, very leafy species, 8–16 in. high; rhizomes stout, running in sand. Culms very short, stout. Leaves much longer than the culms, flexuous, rigid,  $\frac{1}{12}$  in. diam., keeled, grooved, scabrid. Spikelets 4 or 5, hidden amongst the leaves, close together, short,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, stout, erect, sessile or peduncled, upper male, slender; bracts very long, leafy. Glumes small, ovate, obtuse, acute or cuspidate, pale-brown; margins white, membranous. Utricle much larger than the glume, large,  $\frac{1}{6}$  in. long, turgid, ovate, not nerved, smooth, pale-brown, opaque; beak short, 2-cuspidate. Stigmas 3.

**Northern** and **Middle** Islands: on sandy shores abundant, *Banks and Solander*, etc.; as far south as Port Preservation, *Lyall*. A native of Australia, Tasmania, and Japan.

16. **C. Forsteri**, *Wahlenberg*;—*Fl. N. Z.* i. 285. A rather flaccid, grassy, pale-green species. Culms 6–24 in. high, very leafy, slender or stout, slightly scabrid. Leaves flaccid and grassy, longer than the culms,  $\frac{1}{5}$ – $\frac{1}{2}$  in. diam., flat, not keeled, rather scabrid. Spikelets 3–8, very variable in size,  $\frac{1}{2}$ – $4\frac{1}{2}$  in. long, distant or close together, cylindric, pale, 1–3 upper male, the rest all female or with male flowers above or below, sessile or shortly peduncled, erect or nodding; bracts very long and leafy. Glumes very numerous, linear or lanceolate, cuspidate or shortly awned, membranous, pale red-brown, margins and nerve white. Utricle much larger than the glume, spreading, stipitate, elliptic-lanceolate, compressed, strongly nerved; beak long, 2-furcate. Stigmas 3.—Boott, Ill. Carex, t. 137; *C. debilis*, Forst.; *C. recurva*, Schkuhr; *C. punctulata*, A. Rich. Flora, t. 22.

Var.  $\beta$ . *minor*. Spikelets 3,  $\frac{1}{2}$ –1 in. long, sessile, crowded. Glumes often minute, subulate, and long-awned.

Var.  $\gamma$ . *fascicularis*.—*C. fascicularis*, Solander; Fl. N. Z. i. 283. Leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad. Spikelets with male flowers below.—Boott, Ill. Carex, i. t. 139, 140; *C. pseudocyperus*, Br.; Forst. not Linn.

**Northern** and **Middle** Islands: all varieties abundant in moist woods, etc., *Banks and Solander*, etc. Also common in Southern Australia and Tasmania. Very closely allied to indeed to the northern *C. pseudocyperus*.

17. **C. cataractæ**, *Br.* A rather small, flaccid, leafy, pale green species. Culms 6–10 in. high, stout, 3-gonous, grooved, smooth. Leaves much longer than the culms, flat, not keeled, striate,  $\frac{1}{2}$ – $\frac{1}{8}$  in. broad. Spikelets 6–8, very short, sessile or peduncled, erect, crowded, very pale green,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, stout, 3 upper male, lower female, or male at the top only. Glumes few, small, ovate, acute or obtuse, white, membranous. Utricle much larger than the glumes, spreading or deflexed, oval, turgid, green, strongly nerved; beak 2-cuspidate. Stigmas 3.—Fl. Tasm. t. 151 B.

**Middle** Island: Southern Alps, *Sinclair and Haast*; swampy gullies, Waitaki river, etc., *Haast*; Otago, lake district, *Sinclair and Haast*. Also a native of Tasmania.

18. **C. breviculmis**, *Br.*;—*Fl. N. Z.* i. 283. t. 63 A. A small, tufted, leafy species, 1–10 in. high, nearly smooth. Culms very short indeed. Leaves many times longer than the culms, very narrow,  $\frac{1}{20}$ – $\frac{1}{6}$  in., flat, keeled, grooved. Spikelets hidden amongst the leaves, few, crowded together, sessile,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, pale-green, male terminal, females with sometimes a few male flowers at the tip; bracts long, leafy. Glumes 6–8, nearly white, ovate, cuspidate or shortly awned. Utricle shorter than the glume, narrow elliptic-oblong, narrowed at both ends, scarcely beaked, nerved, green, pubescent. Stigmas 3.

**Northern** Island: in grassy places, Bay of Islands, Tarawara, Ahuriri, etc., *Colenso*, etc. Also a native of South-East Australia and Tasmania, Japan, China, and the Himalaya mountains.

19. **C. trifida**, *Cavanilles*;—*Fl. N. Z.* i. 284. A very large, tall, robust, leafy sedge, 3–6 ft. high. Culms stout, obtusely 3-gonous, leafy, smooth. Leaves very large and long,  $\frac{1}{2}$  in. broad and more, flat, keeled, striate; margins scabrid. Spikelets 6–10 or more, approximate, dark-brown, shortly peduncled, erect or nodding, cylindric, very large, 2–4 in. long,  $\frac{1}{2}$  in. broad, lower sometimes compound; bracts very long and leafy. Glumes linear-oblong or lanceolate,  $\frac{1}{3}$  in. long, membranous, red-brown, 2-fid with a hispid awn at the tip. Utricle shorter than the glumes, oblong-obovate, strongly nerved; beak 2-fid. Stigmas 3.

**Northern** Island: Totara-nui, *Banks and Solander*. **Middle** Island: Akaroa, *Raoul*; Dusky Bay, *Lyall*; Otago, *Lindsay*. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* Much the largest New Zealand species. Also a native of Fuegia, South Chili, and the Falkland Islands.

20. **C. Neesiana**, *Endl.*—*C. Solandri*, Boott; *Fl. N. Z.* i. 284. Culms tall, very slender, leafy, 1–2 ft. high. Leaves long, very narrow,  $\frac{1}{10}$  in. diam., flat, grassy, keeled. Spikelets 6–10, distant, on long slender peduncles, nodding,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. long, dark-brown, slender, cylindric, upper 1–4 male, lower sometimes compound; bracts long, leafy. Glumes ovate (rarely emarginate), cuspidate or shortly awned, very pale-brown. Utricle as long as the glumes, ovate- or elliptic-oblong, smooth, obscurely nerved, dark-brown, shining; beak short, sometimes scabrid or toothed at the edges, 2-cuspidate. Stigmas 3.—*C. Solandri*, Boott, Ill. *Carex*, i. t. 175.

**Northern** Island: Totara-nui, Oparagi, etc., *Banks and Solander*, *Colenso*; Wellington, *Ralphs, Stephenson*. A native of Norfolk Island.

21. **C. dissita**, *Solander*;—*Fl. N. Z.* i. 284. Habit of *C. Neesiana*, but more robust. Leaves broader,  $\frac{1}{6}$  in. diam., flat, grassy, membranous, not keeled. Spikelets 5–8, distant, shortly peduncled, erect or nodding, short,  $\frac{1}{2}$ –1 in. long, stout, cylindric, pale-brown, uppermost one male, the rest female or male at the base only. Glumes broadly ovate, 2-fid, shortly awned, dark-brown; keel green. Utricle as large as the glumes, like *C. Neesiana*, but shorter. Stigmas 3.—Boott, Ill. *Carex*, i. t. 176.

**Northern** Island: not uncommon in grassy places, Oparagi and Tigada, *Banks and Solander*. **Auckland** and **Great Barrier** Islands, *Sinclair*; east coast, Patea, *Colenso*.



Very near *C. Neesiana*, but spikelets much shorter and stouter, leaves broader, and glumes 2-fid.

22. **C. Lambertiana**, Boott;—*Fl. N. Z.* i. 284. Very similar in habit and characters to *C. dissita*, but larger, stouter, 2 ft. high, with coarser leaves  $\frac{1}{4}$  in. diam., longer spikelets 1–1 $\frac{1}{2}$  in. long, and always solitary male spikelets.—Boott, Ill. Carex, t. 177.

**Northern Island**: probably common, Totara-nui, *Banks and Solander*; Waitaki and Great Barrier Island, and Auckland, *Sinclair*; Bay of Islands, *J. D. H.* This appears to me a large form of *C. dissita*. I find no difference in the 2-cuspidate tip of the utricles of the two.

23. **C. vacillans**, *Solander*;—*Fl. N. Z.* i. 285. Culms very slender, 1 ft. high, scabrid, leafy. Leaves longer or shorter than the culms, rather rigid,  $\frac{1}{5}$ – $\frac{1}{4}$  in. broad, flat, striate, nearly smooth. Spikelets 5–9, approximate or distant, long peduncled, drooping, 1–3 in. long, cylindric, bright yellow-brown, uppermost 1–3 male, the rest male at the base only, lower lax-flowered at the base; bracts long and leafy. Glume ovate-subulate or lanceolate or almost linear-oblong, entire, shortly awned, pale red-brown. Utricle longer than the glume, fusiform, strongly nerved; beak long, 2-cuspidate. Stigmas 3.

**Northern Island**: common in moist woods, *Banks and Solander*, etc., *Sinclair*, *Colenso*. This again is very closely allied to the preceding two, but has the entire glumes of *C. Neesiana*, longer spikelets and peduncles, and much longer, narrower, strongly nerved utricles.

---

I have another, apparently very distinct species of *Carex*, collected near Lake Okau by Haast along watercourses, but in too immature a state for description. Leaves very coriaceous, flat, 10–12 in. long,  $\frac{1}{4}$  in. broad. Male spikelets 5 or 6, shortly peduncled; female 6–8, very long-pedicelled, slender, cylindrical, with male flower at top. Glumes entire, cuspidate or short-awned. Stigmas 2.

## ORDER XII. GRAMINEÆ.

Grasses, usually tufted plants, either perennial with often creeping rhizomes, or annual with fibrous roots. Culms hollow, closed at the joints, terete. Leaves alternate, usually distichous, very long, flat convolute or keeled; sheaths split to the base, often having a membranous appendage (ligule), where the sheath joins the blade.—Flowers minute, hermaphrodite or unisexual, in the axils of imbricating 2-ranked scales (glumes), which are arranged in spikelets. Spikelets green, spiked paniced or fascicled. Glumes usually coriaceous, lanceolate, concave, keeled and ribbed, rarely flat, lower 2–4 empty, the rest often bearing a 2-nerved scale (pale) in their axis, between which and the glume is a hermaphrodite or unisexual flower; in one section (*Poaceæ*) there are only 2 empty (flowerless) glumes which are nearly opposite, and the rest are alternate on a slender rachis, the terminal being often imperfect; in the other section the uppermost glume is always hermaphrodite, and those below it have either male flowers or are flowerless. Perianth of 2 very minute, often oblique scales. Stamens 3 (rarely 1, 2, or 6, or more); filaments capillary; anthers versatile. Ovary with 2 feathery stigmas; ovule 1, erect. Fruit a grain, free or adhering to the pale. Seed firmly adhering

to the membranous pericarp; albumen hard, floury; embryo small, nearly orbicular, on one side of the base of the albumen.

One of the largest and most important Orders of flowering plants, found in every region of the globe except the very coldest. The New Zealand species are in general very closely allied to Australian; like the *Cyperaceæ*, they have not been well collected either in the Northern or Middle Islands; Mr. Colenso alone having carefully sought for them. The determination of the genera is very difficult, and the species of some genera even more so.

A. *Spikelets on the spines of globose, polygamous, involucrate heads* 5. SPINIFEX.

B. *Spikelets sessile, in 1 or 2 series, on one or both sides of a flattened rachis. Empty glumes 0 or 1-3 (see Festuca bromoides, in C. III. β).*

Empty glumes 2 or 3, short; flowering solitary hard . . . . . 6. PASPALUM.

Empty glume 1, margins connate; flowering solitary. Pale 0 . . . . . 9. ZOYSIA.

Empty glumes 2, lanceolate; flowering 3-16-awned . . . . . 25. TRITICUM.

Empty glume 0 or 2 bristles; flowering 1-3-awned . . . . . 26. GYMNSTICHUM.

C. *Spikelets never sessile and distichous, pedicelled paniced or racemed.*

I. *Empty glumes 3 or more, below the solitary hermaphrodite flowering one.*

Glumes 5; 4 empty, acuminate, 1-flowering, obtuse . . . . . 1. EHRHARTA.

Glumes 5; 2 empty minute, 2 empty awned, 1-flowering, acuminate . . . . . 2. MICROLENA.

Glumes 4, short, obtuse; 2 empty, 1 male, upper hermaphrodite . . . . . 8. ISACHNE.

Glumes 4, mucronate or awned; 2 empty, 1 male, upper hermaphrodite . . . . . 7. PANICUM.

II. *Empty glumes 2, below the solitary flowering one.*

a. *Panicle dense, cylindric, spike-like (see Poa anceps and Danthonia in III.).*

Empty glumes equal, flattened. Pale 0. Panicle soft, spiciform . . . . . 3. ALOPECURUS.

Empty glumes rigid, acuminate. Panicle reduced to an ovoid, spinulose head . . . . . 10. ECHINOPOGON.

β. *Panicle effuse or contracted.*

Fl. glume on a bearded pedicel, tip 2-fid, awned . . . . . 11. DICHELACHNE.

Fl. glume pedicelled, ending in a long rigid awn . . . . . 12. APERA.

Fl. glume sessile, short, acute. Seed loose in pericarp . . . . . 13. SPOROBOLUS.

Fl. glume sessile, truncate, awned at back or awless . . . . . 14. AGOSTIS.

III. *Empty glumes 2, below the 2 or more flowering ones. Glume 1 in Festuca bromoides.*

*Flowering glumes rarely 1 in Poa anceps, in Danthonia, and Deschampsia.*

a. *Flowering glumes awned, sometimes awless in Hierochloe (see Festuca in β).*

Fl. glumes 2-5, silky; awn at the 2-fid tip, slender . . . . . 15. ARUNDO.

Fl. glumes 2-8, 2-cuspidate, with stout dorsal awn, and long hairs on sides and at base . . . . . 16. DANTHONIA.

Fl. glumes 2-4, silky at base, 3-awned, middle awn longest . . . . . 19. TRisetum.

Fl. glumes 2 or 3, shining, truncate, or 4-toothed . . . . . 17. DESCHAMPSIA.

Fl. glumes 3, shining, obtuse, 2 lateral ♂ 3-androus, central, ♀ 2-androus . . . . . 4. HIEROCHLOE.

Fl. glumes 3-7, shining, 2-fid, with a short obtuse awn or 0. Panicle spiciform . . . . . 18. KÆLERIA.

Fl. glumes 4-10, 2-fid, with an intermediate awn. Ovary villous at top . . . . . 24. BROMUS.

β. *Flowering glumes not awned except in some Festucas (see Hierochloe and Kæleria in α).*

Fl. glumes 6-14, short, obtuse, green. Scales connate . . . . . 20. GLYCERIA.

Fl. glumes 2, short, truncate, erose, membranous . . . . . 21. CATABROSA.

Fl. glumes 2-10, compressed, keeled, obtuse or acute . . . . . 22. POA.

Fl. glumes 2-10, convex or keeled at back, often awned at the entire tip . . . . . 23. FESTUCA.

## ARRANGEMENT OF THE GENERA ACCORDING TO THE NATURAL SYSTEM.

(THE NON-INDIGENOUS GENERA ARE IN ITALICS.)

\* *Spikelets with 1 fertile terminal flower, with or without a male or imperfect flower below it (Paniceæ).*

1. **Oryzæ.** Flowering glumes hardening, and enclosing the grain. Empty glumes 4 or 5, unequal, laterally compressed, lower smaller.—1, *EHRHARTA*; 2, *MICROLÆNA*.

2. **Phalaridæ.** Flowering glume and pale hardening, and enclosing the grain. Empty glumes 2, equal, laterally compressed, keeled, longer than the flowering.—3, *ALOPECURUS*, *Phalaris*; 4, *HIEROCHLOE*, *Phleum*, *Anthoxanthum*, *Phalaris*.

3. **Paniceæ.** Flowering glume and pale hardening, and enclosing the grain. Empty glumes 2–4, outer smaller, often dorsally compressed.—5, *SPINIFEX*; 6, *PASPALUM*; 7, *PANICUM*; 8, *ISACHNE*.

4. **Andropogonæ.** Flowering glume small, thin, transparent, or 0.—9, *ZOYSIA*, *Anthistiria*, *Andropogon*, *Apluda*.

\*\* *Spikelets with 1 or more perfect flowers; the male or imperfect flowers, if present, above the perfect ones, the axis or rachis often ending in a point or bristle.*

5. **Agrostidæ.** Spikelets 1-flowered. Flowering glume awnless or with a simple awn. Grain free.—10, *ECHINOPOGON*; 11, *DICHELACHNE*; 12, *APERA*; 13, *SPOROBOLUS*; 14, *AGROSTIS*.

6. **Stipacæ.** Spikelets 1-flowered. Flowering glume firm, with a simple or 3-cleft awn jointed on to its tip, closely enveloping the grain.—*Aristida*.

7. **Arundinæ.** Spikelets usually 2- or more-flowered, rachis with long silky hairs. Glumes all membranous, free.—15, *ARUNDO*.

8. **Chloridæ.** Spikelets 1- or several flowered, sessile on the linear branches of a panicle or on a simple spike.—*Cynodon*, *Eleusine*.

9. **Avenacæ.** Spikelets 2- or more flowered. Flowering glumes on a slender rachis, usually shorter than the empty ones, membranous, shining, split at the top with an intermediate awn that is often wisted at the base (rarely awnless).—16, *DANTHONIA*, *Holcus*; 17, *DESCHAMPSIA*; 18, *KÆLERIA*; 19, *TRisetum*, *Avena*.

10. **Festucacæ.** Spikelets usually 4- or more flowered. Flowering glumes usually longer than the empty ones, on a flexuous rachis.—20, *GLYCERIA*; 21, *CATABROSA*; 22, *POA*; 23, *FESTUCA*; 24, *BROMUS*.

11. **Hordeacæ.** Spikelets 1- or more flowered (spiked), sessile on opposite sides of a simple rachis, solitary or 2 or 3 together, the glumes standing right and left to the axis of the spike.—25, *TRITICUM*; 26, *GYMNOSTICHUM*, *Hordeum*, *Lolium*.

1. *EHRHARTA*, Thunberg.

Culms branching. Leaves flat or concave, not involute. Spikelets panicle, 1-flowered.—Glumes 5, keeled, compressed, 4 lower empty, acuminate, flowering one terminal, obtuse. Pale linear. Scales 2-lobed. Stamens 2–6. Ovary sessile. Grain free within the hardened glumes.

An Australian, South African, and New Zealand genus.

1. **E. Colensoi**, *Hook. f. Fl. N. Z.* i. 288. t. 65 A. Tufted, glabrous, 4–8 in. high. Leaves suberect, distichous, 2–4 in. long, contracted at the sheath,  $\frac{1}{4}$  in. broad, linear-subulate, scaberulous above, smooth below; nerves faint; ligule short, ragged. Panicle  $1\frac{1}{2}$ –2 in. long, inclined. Spikelets on slender pedicels, compressed, linear-oblong,  $\frac{1}{4}$  in. long. Glumes deeply striate or nerved; lower pair empty, acuminate; 2 following almost awned with silky hairs at the base; flowering shorter. Pale small, narrow, with 2 nerves, and a small bristle at its outer base. Stamens 2; anthers short.

**Northern Island:** forming large tufts on the tops of the Ruahine mountains, *Colenso*.

## 2. MICROLÆNA, Br.

Very slender, perennial grasses, simple or branched. Leaves small or long, flat or concave, not involute. Spikelets racemed or paniced.—Glumes 5; 4 lower flowerless, 2 lowermost opposite, minute; 2 following awned, much larger; terminal or flowering acuminate or awned. Pale short, linear, hyaline. Scales 2, glabrous. Stamens 2–4. Ovary sessile. Grain free within the hardened glumes.

A small genus (including *Diplax*, Br.) of Australian, Tasmanian, and New Zealand Grasses, natives generally of woods.

Two lowest glumes distant from the following . . . . . 1. *M. stipoides*.  
Two lowest glumes close to the following (*Diplax*).

Spikelets paniced. Leaves scabrous,  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad. Stamens 2 . . . 2. *M. avenacea*.

Spikelets racemed. Leaves smooth,  $\frac{1}{12}$ – $\frac{1}{8}$  in. broad. Stamens 4 . . . 3. *M. polynoda*.

1. ***M. stipoides*, Br.**;—*Fl. N. Z.* i. 289. A slender grass, 18–24 in. high. Leaves glabrous or sparingly hairy, 2–6 in. long. Panicle slender, nodding, branched below. Lower spikelets on long pedicels, upwards of 1 in. long, awns included. Glumes: lowest pair very minute, acute, deciduous; 2 following seated at distant intervals on the bearded rachis, scabrid, awns as long as themselves; uppermost or flowering acuminate. Scales large. Stamens 4.—*Ehrharta stipoides*, Labill. *Fl. Nov. Holl.* i. 16. t. 118.

**Northern Island**: East Cape, Hawke's Bay, and Cape Palliser, *Colenso*; Auckland, *Sinclair*. A common Australian and Tasmanian plant.

2. ***M. avenacea*, Hook. f.**—*Diplax avenacea*, Raoul, *Choix*, ii. t. 3; *Fl. N. Z.* i. 289. A tall, handsome grass, 2–4 ft. high. Culms densely tufted, compressed and leafy at the base, simple and quite smooth above. Leaves  $1\frac{1}{2}$ –2 ft. long,  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad, margins scabrid. Panicle 10–15 in. long, with many long, capillary branches. Spikelets on capillary pedicels,  $\frac{1}{2}$  in. long (awns included). Glumes: lowest pair very minute, unequal, persistent; 2 following close to the preceding, with long awns; upper or flowering acuminate. Stamens 2.

**Northern and Middle Islands**: abundant in woods, *Banks and Solander*, etc.

3. ***M. polynoda*, Hook. f.**—*Diplax polynoda*, *Fl. N. Z.* i. 290. Culms tufted, very long, 3–6 ft., slender, or stout and rigid, terete, branched, with knots at the joints, quite smooth. Leaves not scabrid, very narrow, 4–8 in. long,  $\frac{1}{12}$ – $\frac{1}{8}$  broad. Racemes simple, few-flowered. Spikelets on rather short pedicels, with the awns  $\frac{1}{2}$  in. long. Glumes as in *M. avenacea*, but awns of the 2 upper flowerless ones, shorter. Stamens 4.

**Northern Island**: base of the Ruahine range and east coast, *Colenso*.

## 3. ALOPECURUS, Linn.

Creeping or erect, glabrous or downy grasses. Culms generally simple, leafy. Leaves flat. Panicles contracted into dense, cylindrical, obtuse spikes. Spikelets very shortly pedicelled, imbricated, 2-flowered.—Empty glumes equal, much compressed, keeled, usually connate at the base, erect, acute; flowering glume shorter, becoming hard, keeled; awn if present short, straight, dorsal. Pale 1-nerved or 0. Scales 0. Stamens 3. Grain free within the hardened glumes.

A considerable genus, confined to temperate or subtropical countries.



1. **A. geniculatus**, Linn.;—*Fl. N. Z.* i. 290. Culms prostrate and creeping at the base, then erect, 1–2 ft. high. Leaves glabrous, soft, flat; sheaths large, grooved; ligule long, membranous. Spike green, downy,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, cylindric; rachis woolly. Empty glumes connate at the very base only, membranous, very flat, keel with long bristles; awn variable in length and position, recurved. Pale 0.

**Northern** and **Middle** Islands: marshy places, not unfrequent; east coast, *Colenso*; Canterbury, *Lyall*; Lake Okau, *Haast*; Otago, lake district, alpine, *Hector* and *Buchanan*. A very common European, North American, and North Asiatic Grass, also found in Victoria and Tasmania; the common “Foxtail Grass” of England.

*A. agrestis*, Linn., introduced into New Zealand, may be known by the outer glumes connate to the middle (*Wellington*, Stephenson, No. 111).

*Phleum pratense*, Linn., is another English naturalized Grass, distinguished from *Alopecurus*, which it closely resembles in characters, by the awned outer glumes.

*Anthoxanthum odoratum*, Linn., a very common and widely distributed European Grass, which gives the sweet smell to new-made hay, is widely dispersed in New Zealand, and has been gathered in a viviparous state at 3–4000 ft. on Mount Cook by Haast. It may be recognized by its scent (of *Hierochloe*) when drying, and the oblong spiked panicle, 2 outer empty glumes, 2 next also empty, both awned, and the fourth, or flowering, very short, awnless, with 2 stamens.

*Phalaris Canariensis*, Linn., another allied introduced Grass, has a large ovoid spiked panicle, and the glumes are large and winged at the keel, with green lines on each side; it is common in many places, and was gathered by Forster.

#### 4. **HIEROCHLOE**, Gmelin.

Erect, tufted, glabrous, sweet-scented, leafy grasses. Leaves flat or involute, rather coriaceous. Panicles usually effuse.—Spikelets rather large, broad, pedicelled, flattened, shining, 3-flowered; 2 lower flowers male, terminal, hermaphrodite. Empty glumes nearly equal, oblong, keeled, obtuse or acute; flowering similar, awnless, or with a terminal or dorsal, short, not twisted awn. Pale 2-nerved. Scales 2, 2-lobed. Stamens 2 in the male fl., 3 in the hermaphrodite. Grain free, terete.

A beautiful genus of Grasses, natives of mountainous arctic and antarctic regions, and of South Africa.

Outer glumes as long as the flowering.

Culms 2–3 ft. Leaves long . . . . . 1. *H. redolens*.

Culms 1–2 ft. Leaves short . . . . . 2. *H. alpina*.

Outer glumes much longer than the flowering ones . . . . . 3. *H. Brunonis*.

1. **H. redolens**, Br.;—*Fl. N. Z.* i. 300. Culms densely tufted, 2–3 ft. high, rather stout, very soft and smooth. Leaves flat, quite smooth or slightly scabrid; ligule broad, membranous. Panicle 6–10 in. long, nodding, branches capillary, slightly hairy, lower 2–3 in. long. Spikelets numerous,  $\frac{1}{4}$  in. long and broad, pale, very shining. Empty glumes 1-nerved, or 3-nerved at the very base; inner 3-nerved to the middle; 2 lower flowering-glumes obtuse, bearded below, downy above, margins and keel ciliated, 5-nerved, shortly awned below the top.—*H. antarctica*, Br.; *Disarrhena Antarcticum*, Labill. *Fl. Nov. Holl.* ii. 83. t. 232.; *Torresia redolens*, A. Cunn.

Abundant in wet places throughout the islands, *Banks* and *Solander*, etc. **Campbell's** Island, *J. D. H.* Also common in Fuegia, Tasmania, and the Alps of South-West Australia.

2. **H. alpina**, *Rœm. and Schultes*.—*H. borealis*, Fl. N. Z. i. 300; Fl. Tasm. ii. 108, not R. and S. Culms tufted, 1–2 ft. high, slender, soft and smooth. Leaves short, 4–8 in. long, strict, quite smooth, flat. Panicle ovate, 2–3 in. long, branches few, spreading, capillary. Spikelets  $\frac{1}{2}$  in. long and broad, shining. Empty glumes short, acute, 3-nerved; flowering pubescent; margins silky with long hairs; awn variable in length and position, usually inserted above the middle and exserted.

**Northern** Island: tops of the Ruahine mountains, *Colenso*. **Middle** Island: Nelson mountains, *Munro, Travers*; Hopkins' river, alt. 2–3500 ft., *Haast*; Otago, lake district, *Hector and Buchanan*. Very tall and stout; also a native of the Tasmanian mountains, and of northern and alpine Europe, Asia, and North America.

3. **H. Brunonis**, *Hook. f.*;—*Fl. Antart.* i. 93. t. 52. Very similar to *H. redolens*, but the empty glumes are much larger, twice as long as the flowering,  $\frac{1}{3}$  in. long, and the flowering have 2-fid acute tips, with awns as long as the glume between the lobes.

**Lord Auckland's** group: tufts on the hills, *J. D. H.*

#### 5. SPINIFEX, Linn.

Very coarse, rambling, much branched, rigid, spinous, bushy, littoral grasses, glabrous or woolly. Leaves long, rigid, wiry, involute. Inflorescence diœcious.—Male spikelets spiked on rigid peduncles which are collected into umbels, with sheathing spathaceous leaves at their bases, 1- or 2-flowered; empty glumes 3, large; flowering glume membranous. Stamens 3; anthers very long. Female spikelets solitary or few in the sheathing bases of very long pungent leaves, which are extremely numerous and collected into very large globose masses, 1- or 2-flowered, 3 empty glumes as in the male, but larger, flowering glume coriaceous. Scales 2, fleshy. Grain free within the glume and pale.

A genus of two or three littoral plants, natives of the coasts of Tasmania and Australia, (where it is said to impede travelling on the western side in some places), and in India and China.

1. **S. hirsutus**, *Labill. Fl. Nov. Holl.* ii. 230, 231;—*Fl. N. Z.* i. 292. A strong-growing, silky or woolly grass; culms stout, knotted, creeping. Leaves 1–1½ ft. long, very coriaceous; lower sheaths shining; upper and back of leaf silky or villous. Male spikes with the rachis 1–3 in. long, numerous, peduncled, silky. Spikelet very shortly pedicelled,  $\frac{1}{3}$  in. long. Glumes acute. Female spikelet at the membranous bases of leaves which terminate in rigid, slender spines 3–5 in. long. Glumes larger than the male; outer awned.—*Ixalum inerme*, Forst.

**Northern** Island: common on the coasts, *Banks and Solander*. **Middle** Island: Canterbury, *Travers*. A common Australian and Tasmanian, Indian and Pacific Island Grass.

#### 6. PASPALUM, Linn.

Tufted or creeping grasses, of various habit. Leaves flat or involute.—Spikelets in the New Zealand species ovoid, much compressed, arranged in two rows on one side of a flat rachis, 1-flowered, short, acute or obtuse, without a callus at the base. Empty glumes 2 or 3, unequal, lower usually very small; flowering concave, hardening and enclosing the pale and grain;

all obtuse or acute, awnless. Pale like the flowering glume, but smaller and 2-nerved. Scales 2, short, fleshy. Stamens 3. Grain free within the hardened glume and pale.

A most extensive tropical and subtropical genus of grasses, often weeds of cultivation, of various forms, etc., not extending into Tasmania. The above character does not apply to many of the non-New-Zealand species.

Erect. Leaves flat. Spikelets obtuse . . . . . 1. *P. scrobiculatum*.  
Creeping. Leaves involute. Spikelets acute . . . . . 2. *P. distichum*.

1. **P. scrobiculatum**, Linn.;—*Fl. N. Z.* i. 291. Glabrous, erect, 1–3 ft. high, stout, leafy. Leaves rather broad, flat or wrinkled, rough at the margin, sometimes hairy at the base. Spikes 2–6, alternate, 1–2 in. long, rachis flat, bristly at the base. Spikelets imbricate in two series, sessile, orbicular,  $\frac{1}{2}$ – $\frac{1}{10}$  in. long. Empty glumes thin, membranous, 1-nerved.—*P. orbiculare*, Forst.

**Northern and Middle Islands**: common, *Banks and Solander*, etc., forming pasture at the Bay of Islands. An abundant tropical and subtropical weed.

2. **P. distichum**, Burmann;—*Fl. N. Z.* i. 291. Creeping, perfectly glabrous. Culms branched, compressed, ascending, 4–10 in. high, covered with leaf-sheaths to the top. Leaves distichous, strict, involute. Spikes in pairs, 1 in. long; rachis narrow. Spikelets pale, loosely imbricate, glabrous, pedicelled, ovate, acute,  $\frac{1}{8}$  in. long.—*P. littorale*, Br.

**Northern Island**: sandy, etc. places, generally near the sea; Bay of Islands, *Cunningham*; Auckland, *Sinclair*. A common tropical and subtropical grass.

## 7. PANICUM, Linn.

Erect decumbent or creeping grasses of very various habit. Leaves flat or involute.—Spikelets variously arranged, naked or with bristles at their base, spiked racemed or paniced, 1-flowered, or if 2-flowered the lower flower male. Glumes 4, awned or awnless, lowest small or minute, empty; 2nd, larger; 3rd, empty or male-flowered; uppermost, with a hermaphrodite flower, fainter-nerved, smooth, hardening, and enclosing the pale and grain. Pale like the glume but smaller, 2-nerved. Scales 2, truncate. Stamens 3. Grain free within the hardened glume and pale.

A most extensive tropical and subtropical genus, not extending into Tasmania.

1. **P. imbecille**, Trinius.—*Oplismenus æmulus*, Kunth;—*Fl. N. Z.* i. 292. Culms slender, prostrate, rooting, ascending, weak, sparingly branched, 6–10 in. long. Leaves 1–6 in. long,  $\frac{1}{4}$ –1 in. broad, lanceolate; sheaths and knots more or less pilose. Spikelets spiked in distant clusters of 2–6, nearly sessile,  $\frac{1}{2}$  in. long, glabrous or nearly so, naked or with a brush of long hairs at their bases. Glumes 4, 3 empty concave, membranous, 3-nerved, green, pilose or glabrous; lower shorter, with a long, flexuous, stout, obtuse awn; 2nd, rather larger, acute or cuspidate, rarely awned; 3rd, acute; flowering one terete, nerveless, coriaceous, white, shining.—*Orthopogon æmutus*, Br.; *Hekaterosachne elatior*, Steudel.

**Northern Island**: frequent in woods and shady places, *Banks and Solander*, etc.

**Middle Island:** Canterbury, *Lyall*. Probably a form of some common Indian Grass; it is also found in Australia and the South Sea Islands.

The following grasses, allied to *Panicum*, are introduced as doubtful denizens.

*Panicum (Digitaria) sanguinale*, Linn., an annual, prostrate or erect grass, with more or less hairy leaves; panicle of 6-8, very slender, almost digitate, strict branches, 2-4 in. long; spikelets in pairs on one side of the branches, minute, 1 sessile, the other pedicelled; lowest glume very minute, 2nd concave, shorter than the 3rd, which is flat and 5-nerved.

*P. colonum*, Linn., one of the commonest of Australian and tropical grasses, has erect culms, 1-2 ft. high; leaves flat, glabrous; panicle of 6-10 short, curved, ascending, alternate, flat branches; spikelets green, crowded in 2-4 rows on one side of the branchlets; glumes hispid; outer, broad, short; 2 following, flat, acute or cuspidate.

*P. gibbosum*, Br., is indicated by Raoul as a New Zealand plant, but I suspect some mistake; it is a slender tropical Australian grass, with a solitary filiform spike, and bearded glumes, the flowering one gibbous.

*P. glaucum*, Linn., an excessively common, tropical, and temperate annual weed, has an ovoid panicle like *Echinopogon*, with many rough bristles on the pedicels of the spikelets, and the flowering glume wrinkled.

### 8. ISACHNE, Br.

Tufted grasses. Leaves generally flat; mouth of the sheath bearded.—Spikelets panicle, short, ovoid, 2-flowered, lower flower usually male, upper hermaphrodite. Empty glumes 2, nearly equal, often deciduous; flowering 2, nearly equal, hardening and surrounding the pale and grain. Pale nearly as large as the glumes, 2-nerved, also hardening. Scales 2, truncate. Stamens 3. Grain free within the hardened glumes and pale.

A small tropical and subtropical genus, common in Australia, but not extending into Tasmania.

1. **I. australis**, Br.;—*Fl. N. Z.* i. 291. Culms, 6-18 in. high, rather slender, decumbent and creeping at the base. Leaves scaberulous, 3-5 in. long,  $\frac{1}{6}$ - $\frac{1}{4}$  broad, flat. Panicle erect, ovoid, 1-2 in. long, lax; branches long, flexuous, sparingly divided. Spikelets few, pedicelled, obtuse,  $\frac{1}{2}$  in. long; pedicels with a pellucid gland. Empty glumes glabrous; lower flowering sessile, glabrous; upper stipitate, pubescent.—? *Panicum gonatodes*, Steudel.

**Northern Island:** Bay of Islands, *A. Cunningham*; Auckland, *Sinclair*; Lake Taupo, *Colenso*. Common in Australia, India, and China.

### 9. ZOYSIA, Willdenow.

Small, creeping, usually littoral grasses, with rigid, running rhizomes. Leaves distichous, grooved or involute, filiform.—Spikelets few (1-10), sessile or shortly pedicelled, alternate and imbricating, on a stiff, erect, flattened flexuous rachis. Empty glume 1, ovoid, terete, convolute, rigid, very coriaceous, glabrous, even, obtuse mucronate or awned; flowering glume solitary, sessile, included, membranous, convolute. Pale membranous or 0. Stamens 3. Grain free.

The genus consists of one variable species, common on the shores of the Indian, Australian, and Chinese seas, sometimes attaining 1 ft. high, with a compound spike.

1. **Z. pungens**, Willd.;—*Fl. N. Z.* i. 312. Culms 1-2 in. high, tufted, quite glabrous. Leaves spreading, filiform or subulate, involute, 1-3 in. long; sheaths tumid, grooved; ligule 0. Spike  $\frac{1}{8}$ - $\frac{1}{2}$  in. long, often reduced to a solitary erect spikelet. Spikelets  $\frac{1}{10}$ - $\frac{1}{2}$  in. long. Glume ovoid or more elongated,



yellow, green towards the keeled tip, which is sometimes produced into an awn more than half its own length.—*Rottbœllia uniflora*, A. Cunn.

**Northern** Island: sandy and muddy places, generally near the sea, from the Bay of Islands southwards. **Middle** Island: Motucka valley, *Munro*.

*Anthistiria australis*, Br., the Kangaroo-grass of Australia, has been gathered by Sinclair near Auckland, but is not indigenous.

*Andropogon refractus*, Br., is an Australian Grass, of which I find a solitary specimen, without locality or ticket, in A. Cunningham's Herbarium, probably accidentally introduced there.

*Apluda mutica*, Linn. Of this, a common tropical Indian Grass, I find a single specimen, without ticket or locality, amongst Sinclair's Auckland plants.

### 10. ECHINOPOGON, Palisot.

Culms tufted, erect, simple, scabrid. Leaves flat. Panicle contracted to an oblong or ovoid, dense spike, bristling with rigid awns.—Spikelets subsessile, horizontal, 1-flowered, green. Empty glumes equal, as long as or longer than the flowering, rigid, acuminate; flowering one with a silky pencil of hairs at the base, 2-fid at the tip; awn terminal, long, rigid, not twisted. Pale as long as the glume, with a short stiff pedicel at its base. Stamens 3. Ovary bearded at the top. Grain free.

A genus of one species, differing from *Agrostis* in habit, inflorescence, the rigid glumes, terminal awn, and ovary bearded at top.

1. **E. ovatus**, *Palisot*;—*Fl. N. Z.* i. 298. A harsh, very scabrid Grass, 6–24 in. high; sheath of upper leaf long. Spike  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long.—*Agrostis ovata*, Forst.;—*Labill. Fl. Nov. Holl.* i. 19. t. 21; *Hystericina alopecuroides*, Steudel.

Abundant throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. Also abundant in Southern Australia, Tasmania, and Norfolk Island.

### 11. DICHELACHNE, Endlicher.

Erect, rigid, tufted, annual or perennial grasses. Leaves flat subulate or convolute. Inflorescence a contracted panicle.—Spikelets long and narrow, 1-flowered, shining. Empty glumes 2, membranous, acuminate; flowering one as long, on a bearded pedicel, scabrid or silky, 2-fid or entire at the tip, with a straight twisted or flexuous awn from the back or from between the lobes, which is not jointed nor thickened at the base. Pale shorter, linear, 2-fid. Scales 2. Stamens 3. Grain long, terete, free.

A small genus, natives of Australia, Tasmania, and New Zealand.

Perennial. Culms stout, 1–3 ft. high. Spikelets  $\frac{1}{2}$ – $\frac{3}{4}$  in. long . . . 1. *D. stipoides*.  
Annual. Culms slender. Panicle dense. Spikelets  $\frac{1}{2}$  in. long . . . 2. *D. crinita*.  
Annual. Culms slender. Panicle lax. Spikelets  $\frac{1}{4}$  in. long . . . 3. *D. sciurea*.

1. **D. stipoides**, *Hook. f. Fl. N. Z.* i. 294. t. 66. Densely tufted, rigid, erect, smooth, polished, handsome, 1–3 ft. high. Leaves longer than the culms, very slender, erect, involute. Panicle strict, erect, 4–6 in. long; branches few, short, capillary, erect. Glumes membranous,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, lanceolate, acuminate; flowering one shorter, covered with silky, spreading hairs. Awn curved, 1 in. long, glabrous.—*Agrostis rigida*, A. Richard; *Dichelachne rigida*, Steud.

**Northern** Island: on maritime banks, rocks, etc., east coast, *Banks and Solander*; Bay of Islands and Auckland, *Sinclair*, etc. Also found in Tasmania and Australia.

2. **D. crinita**, *Hook. f. Fl. N. Z. i. 293*. Culms annual, tufted, 1–3 ft. high, slender or stout, leafy, glabrous downy or rather scabrid. Leaves flat or involute. Panicle elongate, contracted, dense, spike-like, shining; branches almost hidden by the flexuous awns. Spikelet  $\frac{1}{3}$  in. long. Empty glumes narrow, long-acuminate, exceeding the flowering, which is scabrid, acuminate, entire or 2-fid at the tip; awn capillary, inserted at the back above the middle, flexuous, not twisted,  $\frac{3}{4}$ –1 in. long.—*D. vulgaris* and *D. Forsteriana*, Trinius; *Muhlenbergia mollicoma*, Nees; *Agrostis crinita*, Br.; *Apera crinita*, Palisot; *Anthoxanthum crinitum*, Labill. *Fl. Nov. Holl. ii. 115. t. 263*.

**Northern** and **Middle** Islands: abundant in dry soil, *Banks and Solander*, etc. Very common in Australia and Tasmania.

3. **D. sciurea**, *Hook. f. Fl. N. Z. i. 294*. Very similar to *D. crinita*, but smaller, more slender; panicle much thinner, with fewer spikelets; empty glumes shorter, as long as the flowering; and awn twisted, not four times as long as the glume.—*Fl. Tasm. t. 158 A*; *D. Sieberiana*, Trin. and Rup.; *Agrostis sciurea*, Br.; *Stipa micrantha*, Nees; *Muhlenbergia Sieberiana*, Trin.

**Northern** Island: Bay of Islands and Auckland, *Cunningham*, etc. I suspect this is only a variety of the former; it is also found in Australia and Tasmania.

## 12. **APERA**, Adanson.

Slender, erect, annual or perennial grasses. Leaves involute. Panicles with very long, capillary, whorled branches.—Spikelets minute, 1-flowered. Empty glumes 2, nearly equal, membranous, longer than the flowering, which is terete, coriaceous, acuminate, quite entire at the tip, ending in a very slender, straight, not twisted awn. Pale membranous. Scales 2, membranous. Stamens 1–3. Grain terete, enclosed in the coriaceous glume, free.

A small European and North American genus.

1. **A. arundinacea**, *Hook. f. Fl. N. Z. i. 295. t. 67*. A tall, erect, densely tufted, glabrous, most graceful grass. Culms reed-like, with creeping, scaly rhizomes, erect, branched, rigid, strict, 2–5 ft. high. Leaves coriaceous, narrow; margins involute, slightly scabrid; sheaths long; ligule short, truncate. Panicle erect, 8–16 in. long; pedicels alternate on the long whorled branches. Spikelets minute,  $\frac{1}{12}$ – $\frac{1}{10}$  in. long, pale, shining. Empty glumes with a scabrid keel; flowering one sessile on a small glabrous callus, thickened and rough at the top; awn scabrid, deciduous,  $\frac{1}{3}$  in. long. Scales linear. Stamen 1. Ovary pedicelled. Grain truncate.

**Northern** Island: Cape Turnagain, *Colenso*; Akaroa, *Raoul*. Also found in subtropical East Australia.

## 13. **SPOROBOLUS**, Br.

Culms stout or slender, erect, tufted, simple or branched. Leaves flat or involute. Panicles usually contracted, often spike-like, with erect, appressed, capillary branches. Spikelets minute, 1-flowered.—Empty glumes 2, unequal,

awnless; flowering glume sessile, short, awnless. Pale small. Scales 2. Stamens 1-3. Grain free, terete, with a lax pericarp.

A large tropical and subtropical genus of grasses, which does not extend into Tasmania.

1. **S. elongatus**, Br.;—*Fl. N. Z.* i. 295. A stout, rigid, perfectly smooth, glabrous, perennial grass, 1-2 ft. high. Leaves spreading, narrow, involute; ligule short; sheath deeply furrowed. Panicle 6-12 in. long, much contracted, slender. Spikelets pedicelled, minute,  $\frac{1}{20}$  in. long, pale-green.

**Northern Island:** Auckland, *Sinclair*. A common tropical Grass, possibly introduced into New Zealand.

#### 14. AGROSTIS, Linn.

Slender, erect, tufted, usually annual, glabrous or scaberulous grasses. Leaves flat or involute. Panicles generally open, often effuse, with whorled capillary branches, sometimes contracted and spike-like.—Spikelets small, pedicelled, 1-flowered. Empty glumes 2, nearly equal, acuminate or acute, usually longer than the flowering; flowering glume sessile or shortly pedicelled, obtuse acute or truncate, awnless or with a shortly-twisted or straight, dorsal or basal awn. Pale membranous, often minute or 0, sometimes furnished at the base with the pedicel of a third glume. Scales 2. Stamens 2 or 3. Grain oblong, terete, free.

A very large genus, abounding in temperate and cold climates, absent in hot, forming a considerable proportion of pasture in Europe. One-flowered forms of several species of *Poa*, *Danthonia* and *Deschampsia* may be confounded with *Agrostis*.

I. *Glumes membranous, flowering one much shorter than the empty, truncate and jagged at the tip. Pale very membranous, much shorter than the flowering glume, or 0, without the pedicel of a second glume at its base.*

*Flowering glume wholly glabrous, truncate. Panicle usually contracted.*

- |   |                           |
|---|---------------------------|
| Spikelets $\frac{1}{8}$ in., on hispid pedicels . . . . .   | 1. <i>A. antarctica</i> . |
| Spikelets $\frac{1}{12}$ – $\frac{1}{10}$ in.; pedicels scarcely scabrid. Branches of panicle whorled . . . . .                 | 2. <i>A. canina</i> .     |
| Spikelets $\frac{1}{16}$ – $\frac{1}{12}$ in.; pedicels scarcely scabrid. Branches of panicle few, opposite or 3-nate . . . . . | 3. <i>A. parviflora</i> . |

*Flowering glume silky. Panicle very broad.*

- |  |                       |
|--|-----------------------|
| Leaves narrow, usually involute and filiform . . . . . | 4. <i>A. æmula</i> .  |
| Leaves broad, flat . . . . .                           | 5. <i>A. pilosa</i> . |

II. *Glumes membranous; flowering much shorter than the empty, usually bearded at the base and jagged at the tip. Pale very membranous, shorter than the flowering glume, with the silky pedicel of a second glume at its base.*

Branches of panicle whorled, capillary. Spikelets  $\frac{1}{8}$ – $\frac{1}{4}$  in. long . . . . . 6. *A. Billardieri*.

III. *Glumes hard, coriaceous; flowering nearly as long as the empty, often pedicelled, silky at the base. Pale hard, as long as the flowering glume, with a rigid, bearded pedicel of a second glume at its base. (Panicle contracted, branches very short.)*

- |  |                             |
|--|-----------------------------|
| Leaves filiform. Spikelets $\frac{1}{10}$ – $\frac{1}{8}$ in. Awn exserted . . . . . | 7. <i>A. setifolia</i> .    |
| Leaves filiform. Spikelets $\frac{1}{8}$ – $\frac{1}{4}$ in. Awn exserted . . . . .  | 8. <i>A. avenoides</i> .    |
| Leaves concave. Spikelets $\frac{1}{8}$ – $\frac{1}{4}$ in. Awn very short . . . . . | 9. <i>A. Youngii</i> .      |
| Leaves concave. Spikelets $\frac{1}{8}$ – $\frac{1}{4}$ in. Awn exserted . . . . .   | 10. <i>A. quadrisetia</i> . |

1. **A. antarctica**, Hook. f. *Fl. Antarct.* ii. 374. Culms erect, tufted, 6-24 in. high, glabrous and smooth. Leaves involute, shorter than the culms; sheaths glabrous, smooth; ligule oblong, truncate. Panicle 1-4 in.

long, contracted, nodding, pale-green. Spikelets crowded on short, erect, hispid pedicels,  $\frac{1}{6}$  in. long and upwards. Empty glumes nearly equal, lanceolate, long-acuminate; keel ciliate, sides scaberulous; flowering one sessile, half the length of the empty or shorter, glabrous, membranous, truncate; awn from the middle of the back, rather recurved, longer than the spikelet. Pale 0 or small.—*A. multicaulis*, Hook. f. Fl. Antarct. i. 95; perhaps *A. magellanica*, Lamarck.

**Campbell's** Island, on moist banks. The *A. multicaulis* of Campbell's Island is certainly only a small state of the common Chilian and Fuegian *A. antarctica*. Whether this be the same as Lamarck's *A. magellanica* is still doubtful; the Magellanic plant which I have referred to the latter in the 'Flora Antarctica' has a more open panicle, and a small beard at the base of the flowering glume.

2. ***A. canina*, Linn.**;—*Fl. N. Z.* i. 296. Culms tufted, leafy, 1–24 in. high, slender, smooth, and glabrous. Leaves flat or involute, glabrous; sheaths quite smooth; ligule oblong, obtuse, usually lacerated. Panicle open or contracted, usually ovate or lanceolate, 2–4 in. long; branches slender, lower whorled, and slender pedicels slightly scabrid. Spikelets  $\frac{1}{10}$ – $\frac{1}{12}$  in. long. Empty glumes nearly equal, lanceolate, acuminate, glabrous; keel slightly ciliate; flowering glume half the length of the outer, oblong, truncate; awn dorsal or 0. Pale usually 0.

Var.  $\beta$ ? Culms shorter, 1–5 in. high. Panicle much contracted, 1–1 $\frac{1}{2}$  in. long; lower branches very short.—*A. gelida*, F. Muell. mss.

Var.  $\gamma$ ? Culms very short, most densely tufted and moss-like,  $\frac{1}{2}$ –2 in. high. Leaves subulate, often flaccid. Panicle minute, hidden amongst the leaves. Awn 0. Pale 0.—*A. subulata*, Fl. Antarct. i. 95. t. 53; *A. parviflora*,  $\beta$ . *perpusilla*, Fl. N. Z. i. 296.

Mountainous parts of the **Northern** and **Middle** Islands: var.  $\alpha$ , Milford Sound, *Lyall*; alps of Canterbury, common, alt. 2–4000 ft., *Sinclair and Haast*. Var.  $\beta$ , Ruahine range, *Colenso*; ascending higher than any other Grass on Mount Darwin, *Haast*; Otago, lake district, alpine, *Hector and Buchanan*. Var.  $\gamma$ , **Northern** Island: snow rills, top of the Ruahine mountains, *Colenso*. **Middle** Island: Lake Tennyson, alt. 4400 ft., *Travers*. **Campbell's** Island, *J. D. H.*

There can be no question, I think, of the identity of this plant with the common European *A. canina*, which also occurs commonly in Fuegia, and of which I have a specimen from Victoria, F. Mueller, labelled *A. parviflora*. I agree with Colonel Munro in thinking that *A. falklandica* (Fl. Antarct.) is a variety, and *A. tenuifolia* a third form. Of var.  $\beta$  I am not so sure. I have seen no European state of *canina* with so contracted a panicle, nor having such short lower branches. The foliage and flowers are, however, identical; it has been found on the Australian Alps. Var.  $\gamma$  is a very singular little plant, in a depauperated state. *Colenso's* and *Travers's* specimens entirely agree in size and habit. The Campbell Island ones are larger, and may be different; but much more numerous specimens are wanted of all.

3. ***A. parviflora*, Br.**;—*Fl. N. Z.* i. 296. Culms slender, erect, or prostrate at the base, tufted, 6–8 in. high, glabrous. Leaves very narrow, flat involute or setaceous; ligule oblong, truncate, lacerate. Panicle of few lax, long, capillary, 3-chotomous, scabrid branches, opposite or 2- or 3-nate. Spikelets minute,  $\frac{1}{16}$ – $\frac{1}{12}$  in. long, pale-green. Empty glumes spreading, nearly equal, glabrous, scabrid on the keel; flowering glume one-third shorter, quite glabrous, truncate; nerves faint; awn, if present, dorsal, included. Pale minute or 0.—Fl. Tasm. ii. 113. t. 158 B.

**Northern** Island: probably common, but overlooked; east coast, Patca village and shores of Cook's Straits, *Colenso*. **Middle** Island: Otago, lake district, *Hector and*



*Buchanan.* Common in Tasmania and Australia, and very near *A. canina*, from which it is best distinguished by the very lax panicle and smaller spikelets. Nearly allied to the European *A. alpina*, but with a dorsal, never basal awn.

4. **A. æmula**, Br.—*Deyeuxia Forsteri*, Kunth ;—Fl. N. Z. i. 298. A very elegant, glabrous, slender grass. Culms tufted, very slender, 6–24 in. high. Leaves very narrow, involute, often setaceous, rarely flat ; sheaths glabrous ; ligule narrow, oblong. Panicle large, open, spreading ; branches whorled, capillary, 3–6 in. long, usually 3-chotomously branched ; rachis often flexuous. Spikelets  $\frac{1}{10}$ – $\frac{1}{8}$  in. long, on very slender pedicels. Empty glumes equal, lanceolate, long-acuminate, smooth, keel scabrid ; flowering one membranous, shorter by about one-third, sessile, truncate, silky with scattered long hairs, and bearded at the base ; awn from the back about the middle, very slender, exserted. Pale 0 or small, without a pedicel at its base or with a very minute one.—*A. Forsteri*, Rœm. and Schultes ; *A. Lyallii*, Fl. N. Z. i. 297 ; *A. leptostachys*, Fl. Antarct. i. 94 ; *Lachnagrostis Forsteri*, Trinius ; *L. æmula*, Nees ; *Deyeuxia æmula*, Kunth ; *Avena filiformis*, Forst.

Throughout the **Northern** and **Middle** Islands, abundant, *Banks and Solander*. **Campbell's** Island, *J. D. H.* Equally common in temperate Australia and Tasmania. I find the pedicel at the base of the pale to be so often absent, and when present so minute, that I am obliged to remove this plant from the section or genus of *Deyeuxia*, and to unite with it my *A. Lyallii* and *A. leptostachya* ; the latter (from Campbell's Island), however, has unusually large spikelets.

5. **A. pilosa**, *A. Rich.* Flor. i. 134. t. 23 ;—Fl. N. Z. i. 297. Quite similar to *A. æmula*, except in being more coarse and robust, with large flat leaves, sometimes  $\frac{1}{2}$  in. broad, which are described by Richard as pilose and scabrid, but are only scaberulous in my specimens.

**Northern** Island : mountainous districts of the interior, *Colenso*. **Middle** Island : Astrolabe Harbour, *D'Urville* ; Southern Alps, *Sinclair, Haast*, etc. ; Otago, lake district, *Hector* and *Buchanan*. Perhaps only a large form of *A. æmula*, with which it entirely agrees in inflorescence and all floral characters ; but is a different-looking and far more robust plant.

6. **A. Billardieri**, Br.—*Deyeuxia Billardieri*, Kunth ; Fl. N. Z. ii. 298. Culms tufted, erect, leafy, 1–2 ft. high. Leaves 6 in. long,  $\frac{3}{8}$ – $\frac{1}{2}$  in. broad, flat, glabrous or scaberulous ; ligule short, oblong. Panicle very lax, 4–10 in. long, effuse, scabrid ; branches very long, whorled, capillary, 3-chotomous. Spikelets  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, on very slender pedicels, green or purplish. Empty glumes lanceolate, acuminate, keel scabrid, sides glabrous or scabrid ; flowering glume  $\frac{1}{2}$  shorter, truncate, silky at the base, 4-nerved, the lateral nerves produced into short awns ; awn on the middle of the back, bent, half to twice as long as the glume. Pale as long as the glume, longer than the silky pedicel at its back.—*A. vaginata*, Steudel ; *Lachnagrostis Billardieri*, Trinius ; *Avena filiformis*, Labill. Fl. Nov. Holl. i. 24. t. 31, not Forster.

**Northern** Island, *Banks and Solander*, abundant in some places, but apt to be confounded with large states of *A. Forsteri*. Also an abundant Southern Australian and Tasmanian grass.

7. **A. setifolia**, Hook. f.—*Deyeuxia setifolia*, Fl. N. Z. i. 299. t. 65 B. Culms erect, tufted, very slender, wiry, smooth, 6–8 in. high. Leaves very narrow, setaceous or filiform, involute, shorter than the culms, quite smooth ;

ligule oblong; sheaths slender, short. Panicle 1-2 in. long, erect, contracted, very slender, branches few, suberect, short. Spikelets few, shortly pedicelled, erect,  $\frac{1}{10}$ — $\frac{1}{8}$  in. long, pale, shining. Empty glumes rigid, oblong-lanceolate, acuminate; flowering one hard, rather shorter, silky at the base, truncate, 4-toothed; awn on the middle of the back, exserted, rigid, recurved. Pale longer than the very silky pedicel, rigid.

**Northern** Island: Titiokura, top of the Ruahine range and Lake Waikare, *Colenso*.

8. **A. avenoides**, *Hook. f., n. sp.* Culms rigid, wiry, 8-12 in. high, quite smooth, slender. Leaves much shorter than the culms, involute, very slender, smooth; ligule short; sheath short, smooth. Panicle very narrow, erect, 2-4 in. long, much contracted, branches very short, erect, few-flowered. Spikelets  $\frac{1}{8}$ — $\frac{1}{4}$  in. long. Empty glumes oblong-lanceolate, acuminate, rigid, smooth and glabrous; flowering glume sessile, as long, hard, scabrid, 2-fid, silky at the base; awn dorsal, twisted, recurved. Pale as long as the glume; pedicel long, pilose.

**Middle** Island: grassy downs, Rangitata river, *Sinclair and Haast*; Otago, lake district, *Hector and Buchanan*. Closely allied to the Tasmanian *A. montana*.

9. **A. Youngii**, *Hook. f., n. sp.* Similar in habit to *A. avenoides*, but larger, 2-4 ft. high, more robust. Leaves flat,  $\frac{1}{8}$ — $\frac{1}{4}$  in. diam., panicle 4-6 in. long, very slender, flexuous; branches very short. Spikelets  $\frac{1}{8}$ — $\frac{1}{4}$  in. long. Empty glumes oblong-lanceolate, acuminate, rigid, smooth, glabrous, nerveless; flowering glume as long, pedicelled, hard, scabrid, 2-4-cuspidate; awn very short, almost terminal. Pale as long as the glume; pedicel stout, with long silky hairs.

**Middle** Island: dry hillsides, sources of the Waitaki, *Haast*. Allied to the Tasmanian *A. scabra*.

10. **A. quadriseta**, *Br.;—Fl. N. Z. i. 296*. Culm 6 in. to 4 ft. high, smooth or rough, erect, stout or slender. Leaves shorter than the culm, flat or involute, often setaceous, glabrous or scabrid. Panicle 2-6 in. long, slender or stout, usually extremely dense cylindric and spike-like, rarely open below and pyramidal, or interrupted and as it were lobed, pale-green, shining, lower branches sometimes spreading, whorled. Spikelets pedicelled, variable,  $\frac{1}{10}$ — $\frac{1}{8}$  in. long, shining. Empty glumes lanceolate, keels scabrid; flowering glume shorter, on a short bearded pedicel, coriaceous, concave, scaberulous, obscurely 5-nerved; nerves usually ending in minute exserted points or awns, 2-fid with a stout dorsal awn. Pale as long as the glume.—*A. elatior*, Steud.; *Avena quadriseta*, Labill. Fl. Nov. Holl. i. t. 32; *Bromidium*, Nees; perhaps the *Agrostis montana*, Br., of Raoul, Choix, 39.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. Also very common in Australia and Tasmania.

**ARISTIDA CALYCINA**, *Br.;—Fl. N. Z. i. 293*. Culms glabrous, wiry, tufted, annual?, 1 ft. high. Leaves subulate. Panicle 3 in. long, very slender. Spikelets few,  $\frac{1}{3}$  in. long, shortly pedicelled, 1-flowered. Empty glumes of equal length, shorter than the flowering, which has a 3-cleft awn at its tip.

**Northern** Island: Bay of Islands?, *A. Cunningham*. I have seen no reputed New Zealand specimen of this, but its finder's; it is a native of tropical Australia, and not being found by any other collector in New Zealand, I suspect it may have got into A. Cunningham's herbarium by accident.

15. **ARUNDO**, Linn.

Tall, stout, leafy grasses. Leaves flat or involute. Panicles very large, effuse, with excessively numerous, much divided branches, usually nodding to one side.—Spikelets excessively numerous, white, very thin and membranous, silky or shining, 1–5-flowered. Empty glumes nearly equal, very long, lanceolate, acuminate; flowering glumes pedicelled, long, lanceolate, very silky, entire or 2-fid at the tip; the awn straight or twisted. Pale short. Scales 2, fleshy. Stamens 3. Grain free, long, terete.

Noble grasses, found in most tropical and temperate countries, especially in or near water.

1. **A. conspicua**, *Forst.*;—*Fl. N. Z.* i. 299. Culms 3–8 ft. high, growing in dense tussocks, from which rise a profusion of long curving leaves, and erect slender culms, with large white panicles. Leaves coriaceous, narrow, smooth or scabrid. Panicle 1–2 ft. long, branches drooping. Spikelets 1–3-flowered, white, pedicels capillary. Empty glumes  $\frac{1}{2}$  in. long; flowering half as long, surrounded with long silky hairs, acuminate, terminated by the slightly twisted, slender included awn.—*A. australis*, A. Rich.; *A. australis* and *A. conspicua*, A. Cunn.; ? *A. Kakao*, Steud.; *Achnatherum conspicuum*, Palisot; *Gynerium* (?) *Zelandicum*, Steud.; *Calamagrostis conspicua*, Gmel.; ? *Agrostis procera*, A. Rich.

**Northern** and **Middle** Islands: abundant in moist places, *Banks and Solander*, etc.; as far south as Otago, *Lindsay*. The largest New Zealand Grass, and confined to these islands. Culms used for thatching and lining houses with reedwork.

*Cynodon Dactylon*, Linn. An excessively common, small, tropical and temperate grass, much used for fodder in India (Doab Grass), is introduced into New Zealand; it creeps extensively, has involute leaves, digitate strict branches of the panicle; spikelets small, sessile, in 2 rows on one side of the branches, 1-flowered, empty glumes 2 keeled, flowering one pilose, thinner and broader; pale with a bristle at its base.

*Eleusine indica*, Gærtner, a very common tropical Grass, has been gathered near Auckland; it has the habit and inflorescence of *Cynodon*, but is larger and coarser, the glumes obtuse, and grain wrinkled.

16. **DANTHONIA**, Decandolle.

Tufted, usually harsh, rigid grasses. Leaves flat or involute. Panicles effuse or contracted.—Spikelets pedicelled, rather large, coriaceous or scarious, 2- or many-flowered (rarely 1-flowered). Empty glumes unequal or nearly equal, membranous, keeled, awnless; flowering 2 or more, pedicelled, silky or furnished with pencils of hairs on the sides, convex, broadly 2-fid, the divisions subulate cuspidate or awned; dorsal awn from between the divisions, long, slender or stout, filiform or flat and twisted at the base. Pale 2-fid. Scales glabrous or pilose. Stamens 3. Ovary stipitate, glabrous. Grain free.

A large South African, Australian, Tasmanian, and New Zealand genus, also found in the south of Europe. The species are very difficult of discrimination: when the flowering-glumes are reduced to two, the species may be confounded with *Trisetum*; and if to one, with *Agrostis*, but for the more deeply 2-cuspidate flowering-glume; from *Arundo* it is distinguished chiefly by habit, and the more deeply 2-fid flowering-glume; the long silky hairs on the sides of the flowering-glume generally distinguish it from all its allies.

I. *Empty glumes shorter than the spikelet. Flowering glumes with scattered long silky hairs at the base and sides.*

Awn subulate, not flattened nor twisted.

Panicle open, large, effuse, branches 6-8 in. long . . . . . 1. *D. Cunninghamii*.

Panicle short, close, ovoid, branches  $\frac{1}{2}$ -1 in. long . . . . . 2. *D. bromoides*.

Awn flattened and twisted at the base.

Panicle very lax, open. Leaves setaceous . . . . . 3. *D. Raoulii*.

Panicle very lax, open. Leaves flat, very coriaceous . . . . . 4. *D. flavescens*.

II. *Empty glumes longer than the flowering, and including them. Flowering glume with pencils of silky hairs on their sides and base.*

Spikelet  $\frac{1}{2}$  in. Awn longer than glume . . . . . 5. *D. semi-annulari*

Spikelet  $\frac{1}{2}$ - $\frac{1}{4}$  in. Awns included . . . . . 6. *D. Buchananii*.

Spikelet  $\frac{1}{4}$  in. Awn very short indeed . . . . . 7. *D. nuda*.

1. ***D. Cunninghamii***, Hook. f.—*D. antarctica*, var.  $\beta$ . *laxifolia*, Fl. N. Z. i. 303. Culms 3-5 ft. high, stout,  $\frac{1}{4}$  in. diam., quite glabrous or pilose. Leaves very coriaceous, concave, rigid, 1-2 ft. long,  $\frac{1}{4}$  in. broad, glabrous or hairy on the upper surface; sheaths broad; ligule 0, or a line of long hairs. Panicle very open, lax, 8-12 in. long; branches many or few, in distant pairs, very slender, 4-8 in. long, pubescent. Spikelets alternate on the branches, shortly pedicelled,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, 2-8-flowered. Empty glumes unequal, lanceolate or linear-oblong, lower acute or obtuse; flowering  $\frac{1}{6}$ - $\frac{1}{4}$  in. long, narrow, glabrous, except at the base and sides where covered with long silky hairs, deeply 2-fid; awn recurved, not flattened nor twisted at the base, as long as the glume.—*Agrostis pilosa*, A. Cunn. not A. Rich.; *D. rigida*, Fl. N. Z. i. t. 69 A, not Raoul.

**Northern Island**: Bay of Islands, shady woods, Keri-Keri river, *A. Cunningham*; woods near the tops of the Ruahine mountains and Hawke's Bay, *Colenso*. **Middle Island**: uplands near Otago, *Lindsay*; lake district, *Hector and Buchanan*.

2. ***D. bromoides***, Hook. f. Fl. N. Z. i. 303. t. 68 A. Culms and leaves as in *D. Cunninghamii*, but panicle much smaller, oblong or lanceolate, 4-6 in. long, contracted; branches 1-2 in. long, erect. Spikelets broader, glumes closer, more like those of *D. Raoulii*. Awn not flattened nor twisted,  $\frac{3}{4}$  in. long.—*Bromus antarcticus*, Fl. Antarct. i. 97. t. 54, not *Danthonia antarctica*, Fl. N. Z.

**Northern Island**: hills near Wellington, *Stephenson*. **Lord Auckland's group and Campbell's Island**: abundant on the hills, *J. D. H.*

3. ***D. Raoulii***, Steud.—*D. rigida*, Raoul;—Hook. f. Fl. N. Z. i. 303, not Steud. Habit and character of *D. Cunninghamii*, but leaves involute and filiform; spikelets longer, pedicelled, larger,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, broader; glumes larger, both empty ones long acuminate, the flowering closely imbricate, broader, and the awn is flattened and twisted in a corkscrew manner at the base.

**Northern Island**: from halfway up to the tops of the Ruahine range, and hills on the east coast, *Colenso*. **Middle Island**: Akaroa, *Raoul*; common in the Alps, ascending to 3000 ft., *Sinclair and Haast*; Milford Sound, *Lyall*; Tarndale, *Sinclair*; Otago, lake district, alt. 2000 ft., *Hector and Buchanan*. Very like indeed the *D. Cunninghamii*, in some respects, but I think quite distinct; it is more near *D. robusta* of the Victorian alps. The leaves in all specimens from all elevations are almost filiform.

4. ***D. flavescens***, Hook. f. n. sp. A large coarse grass, of the size and



with the habit of *D. Cunninghamii*, from which it differs in the awn being broad, flattened, and twisted like a corkscrew at the base.

**Middle Island:** Southern Alps, *Sinclair and Haast*; Otago, lake district, alt. 2000 ft., *Hector and Buchanan*. One of the "snow grasses." This so much resembles *D. Cunninghamii*, that I advance it as a different species with great hesitation; the widely different awn and locality, however, seem very marked characters.

5. ***D. semi-annularis*, Br.;—Fl. N. Z. i. 304.** Culms tufted, slender, rigid, glabrous or pilose, 6–20 in. high. Leaves filiform or setaceous, involute, rarely flat; ligule 0; mouth of sheath with spreading hairs. Panicle 2–4 in. long, effuse or contracted, of few, erect, short branches. Spikelets few,  $\frac{1}{2}$  in. long, 4–6-flowered. Empty glumes white or purplish,  $\frac{1}{2}$  in. long, nearly equal, much longer than the spikelet; flowering glumes villous at the base, with several transverse series of tufts of hairs above the middle on their sides, deeply 2-fid at the top; lateral awns as long as the glumes; central twisted, black or pale, often twice as long as the glume and recurved.

Var.  $\alpha$ . Leaves glabrous.—*D. semi-annularis*, Labill. Fl. Nov. Holl. i. 26. t. 33; *D. Unaredi*, Raoul, Choix, ii. t. 4; perhaps *D. cingula*, Steudel.

Var.  $\beta$ . *pilosa*. More or less covered with long spreading hairs.—*D. pilosa*, Br.;—Fl. N. Z. i. 303; *D. Gunniana*, Nees.

Var.  $\gamma$ . *gracilis*. Pilose as var.  $\beta$ . Culms very slender. Leaves filiform. Flowering glumes fewer, awns smaller, included, or nearly so.—*D. gracilis*, Hook. f. Fl. N. Z. i. 304. t. 89 B.

Abundant throughout the **Northern** and **Middle Islands**: ascending to 4000 ft., *Banks and Solander*, etc. A most abundant grass in Australia and Tasmania also, very variable, especially in the size and number of the spikelets, and the relative and absolute length of the awns.

6. ***D. Buchananii*, Hook. f. n. sp.** Culms very slender, perfectly glabrous, 5–10 in. high. Leaves erect, involute, filiform. Panicle small, contracted,  $\frac{1}{2}$ –1 in. long; spikelets 6–8, erect, very pale green,  $\frac{1}{5}$ – $\frac{1}{4}$  in. long, on short pedicels. Empty glumes broader than in *D. semi-annularis*, longer than the spikelets; flowering 2-fid at the top, with a slender, scarcely twisted middle awn, which is barely longer than the glumes, with silky hairs at the base and sides.

**Middle Island:** Otago, lake district, *Hector and Buchanan*. This appears a distinct form, though closely allied to *D. semi-annularis*, from which its shorter, broader glumes, short awns, and less silky flowering-glume distinguish it; it is also very near the *D. pauciflora* of Tasmania.

7. ***D. nuda*, Hook. f. Fl. N. Z. ii. 337.** Culms prostrate at the base, 5–8 in. high, slender, leafy, glabrous, much branched below. Leaves involute, filiform, glabrous and smooth; ligule ciliated; sheath with long hairs at the mouth. Panicle small, of 6–10 erect spikelets on short pedicels. Spikelets greenish-white,  $\frac{3}{8}$  in. long, 3-flowered. Empty glumes longer than the spikelet; flowering shortly 2-fid at the top, with a very short intermediate awn, ciliated at the base, and with one tuft of hairs on each side near the margin.

**Northern Island:** mountains near the east coast, *Colenso*. A very distinct species: the glumes are very shortly 2-fid, and the awn not twisted, so that it is not a very characteristic species of the genus, except in its pencil of silky hairs on the glume.

*Holcus mollis*, Linn., one of the most abundant European grasses, occurs as an escape;

it is annual, usually softly pubescent, especially at the knots. Panicle erect, open. Spikelets 2-flowered; empty glumes concave, equal; flowering glumes very deciduous, upper male, awned, lower perfect, awnless.

### 17. *DESCHAMPSIA*, Palisot.

Tall, erect, tufted, usually perfectly smooth, shining grasses. Leaves flat or involute. Panicles large, branched.—Spikelets pedicelled, 2- or 3- rarely 1-flowered. Empty glumes 2, nearly equal, much compressed, keeled, awnless; flowering ones 2 or 3, and a terminal imperfect one, 4-toothed, or jagged at the truncate tip; awn dorsal, short, straight, obtuse. Pale 2-fid. Scales 2, entire. Stamens 3. Grain free.

A small genus of temperate Grasses. The obtuse awn distinguishes 1-flowered specimens from *Agrostis*.

1. *D. cæspitosa*, Palisot;—*Fl. N. Z.* i. 301. An elegant, tall, perfectly smooth, shining grass, rarely scaberulous. Culms 6–36 in. high, rather slender, leafy. Leaves involute, long or short; ligule long, acute; sheaths smooth and shining, glabrous or subpilose. Panicle 3–12 in. long, effuse, one-sided, branches whorled or fascicled, slender, rough, erect or spreading. Spikelets  $\frac{1}{6}$ – $\frac{1}{5}$  in. long, pale, shining, yellow-green or purplish. Empty glumes acute; flowering silky at the base, uppermost often reduced to a villous pedicel; awn basal, as long as the glume.—*Aira Kingii*, Fl. Antarct. 376. t. 135; *Triodia splendida*, Steudel; ? *Aira australis*, Raoul, Choix, 12 (awn omitted); *Agrostis Aucklandica*, Fl. Antarct. i. 96 (form with 1-flowered spikelet).

**Northern** Island: low grounds on the east coast, Te Hawera and Hawke's Bay, common, *Colenso*. **Middle** Island: abundant, ascending to 3500 ft. in the alps. **Lord Auckland's** group, *J. D. H.* A very common and widely diffused Grass in the north and south temperate zones and mountains of Central Africa.

### 18. *KOELERIA*, Persoon.

Erect, rather stout, annual or perennial grasses. Leaves flat or involute. Panicle spike-like, dense.—Spikelets shortly pedicelled, pale, shining, much compressed, 2–4-flowered. Empty glumes lanceolate, acute, unequal or nearly equal, as long as the spikelets or nearly so; flowering ones on a short rachis, like the empty, acute, entire at the tip or 3-toothed, with a short, straight, intermediate awn or 0. Pale as long as the glume. Scales 2. Stamens 3. Grain free.

A small European genus, equally allied to *Deschampsia* and *Poa*, and very difficult to distinguish generically from either.

3. *K. cristata*, Persoon;—*Fl. N. Z.* i. 305. Culms tufted, tall or short, rather stout, stiff, glabrous or downy, 1–3 ft. high. Leaves 6–8 in. long, narrow, flat or involute; ligule very short. Panicle strict, erect, 3–5 in. long, narrow, often interrupted or lobed below, branches very short. Spikelets crowded, erect, imbricated, white or purplish, shining, 2- or 3-flowered,  $\frac{1}{6}$ – $\frac{1}{5}$  in. long. Empty glumes unequal, acute; flowering ones, glabrous, rachis slender, pilose, nerveless, keeled, acuminate, sometimes minutely toothed and shortly awned at the tip. Pale as long as the glume.

**Middle** Island: Aglionby plains, *Munro*; Canterbury plains and Acheron valley, alt.

4000 ft., *Travers*; Otago, *Lindsay*; lake district, *Hector and Buchanan*; terraces on the Southern Alps, *Sinclair and Haast*. A very common European and northern temperate grass, widely diffused in Australia and the south temperate hemisphere generally, but possibly introduced only; it exists in none of the earlier New Zealand collections.

### 19. TRISETUM, Kunth.

Tufted grasses, usually slender, often downy. Leaves involute. Panicles open, or contracted and spiciform.—Spikelets 2–4-flowered. Empty glumes 2, keeled, awnless, shorter than the spikelet; flowering glumes 2–4, with a terminal imperfect one, 2-fid at the tip, divisions subulate; awn from between the divisions, twisted and recurved. Pale 2-nerved. Scales 2. Stamens 3. Grain free, glabrous.

Temperate, alpine, arctic and antarctic grasses, distinguishable from *Danthonia* by habit chiefly.

Glabrous, 1–2 ft. high. Panicle lax, spreading . . . . . 1. *T. antarcticum*.  
Downy, 1–6 in. high. Panicle spiciform . . . . . 2. *T. subspicatum*.  
Pilose, 1–3 ft. high. Panicle very slender, contracted . . . . . 3. *T. Youngii*.

1. **T. antarcticum**, *Trinius*;—*Fl. N. Z.* i. 302. *t.* 68 B. A tufted, erect, slender, smooth, rarely pubescent, shining grass, 1–2 ft. high. Leaves flat or involute, usually narrow, long or short, sometimes setaceous, quite smooth or scaberulous; ligule truncate, very short, often silky. Panicle erect, slender, contracted or effuse, 2–10 in. long; branches short, very slender, sub-erect. Spikelets  $\frac{1}{4}$  in. long, contracted, white, very shining or pale green, 3- or 4-flowered. Empty glumes unequal, acuminate; margins white; keel scabrid; flowering ones pedicelled, deeply 2-fid, with a pencil of long white hairs at the base, scabrous; awn not twisted, recurved, twice as long as the glume.—*Aira antarctica*, Forst.; *Avena antarctica*, Roem. and Sch.; *A. Forsteri*, Kunth; *Danthonia antarctica*, Sprengel; *D. pallida*, A. Cunn.

**Northern and Middle Islands:** abundant, *Banks and Solander*, etc.; not found elsewhere. Haast sends a large form from Lake Okau, with pubescent leaves  $\frac{1}{2}$  in. broad.

2. **T. subspicatum**, *Palisot*;—*Fl. Antarct.* i. 97 and 377. Small, rather stout, densely tufted, usually downy, 4–18 in. high. Leaves shorter than the culms; ligule short, truncate, silky. Panicle dense, subcylindric, spiciform, 1–3 in. long. Spikelets shortly pedicelled, imbricate,  $\frac{1}{8}$  in. long, 2- or 3-flowered, pale greenish-white, shining, pubescent. Empty glumes shorter than the spikelet, unequal, obtuse; flowering ones on hairy pedicels, downy, 2-cuspidate; awn recurved, dorsal, as long as or longer than the glume, inserted below the 2-cuspidate tip.

Var.  $\beta$ . More glabrous. Spikelets rather narrower. Glumes nearly glabrous.

**Middle Island:** Upper Awatere valley, *Sinclair*; Otago, lake district, *Hector and Buchanan*; rivulets of the Hopkins river, alt. 2500 ft., *Haast*. **Campbell's Island**, *J. D. H.* Var.  $\beta$ , Upper Awatere and Wairau valleys, *Sinclair*. A native of arctic Europe, Asia, and America, the alps of the same continents, of South America, Australia, and Tasmania, and of Fuegia.

3. **T. Youngii**, *Hook. f.*, *n. sp.* Culms slender, erect, 2–3 ft. high, glabrous, shining. Leaves flat,  $\frac{1}{8}$ – $\frac{1}{4}$  in. broad, and sheaths pilose; ligule truncate. Panicle slender, 3–6 in. long; branches very short, with few spikelets. Spikelets pale,  $\frac{1}{6}$  in. long, shining, 1- or 2-flowered. Empty glumes

broad, oblong, acute, membranous, as long as the spikelets; flowering glumes 2-cuspidate, nearly glabrous, with a few short hairs at the base; awn dorsal, stout, recurved, exserted, inserted below the 2-cuspidate tip.

**Middle Island:** Macaulay valley, alt. 3-4000 ft., *Haast and Young*. A very distinct species, closely allied to a Victorian alps one, distinguished from *T. subspicatum* by its slender tall culm, long very slender panicle, and broad outer glumes. It may, however, prove to be a form of that species. It is named in compliment to Mr. W. Young, Mr. Haast's able and indefatigable assistant-surveyor, who paid much attention to collecting the Grasses of the Southern Alps.

*Avena sativa*, Linn., the cultivated Oat, has been found as an escape from cultivation in various parts of the islands.

## 20. GLYCERIA, Br.

Erect, glabrous, often aquatic grasses. Culms tufted or creeping below. Leaves flat or involute. Panicle long and contracted.—Spikelets pedicelled, linear, glabrous, herbaceous, many-flowered. Empty glumes unequal, concave, obliquely truncate, much shorter than the spikelet; flowering ones numerous, imbricated, oblong, obtuse, 7-nerved, awnless. Pale as long as the glume. Scales 1, or 2 and connate. Stamens 2 or 3. Grain free, glabrous.

A small genus, found in temperate regions of both the north and south hemispheres, the grain of one species of which has been used as food during famines.

1. **G. stricta**, Hook. f. *Fl. N. Z.* i. 304. Culms slender or stout, glabrous, 1-2 ft. high. Leaves glabrous, short, 2-4 in. long, involute, strict, almost filiform; sheath long, tumid, striate; ligule short, broad. Panicle very slender, 4-6 in. long; branches unequal, strict, whorled, erect, spreading after flowering. Spikelets terete, green,  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, 6-14-flowered. Flowering glumes with obscure nerves. Scales connate, lobed at the broad tip.—*Fl. Tasman.* ii. 123. t. 162 B.

**Northern Island:** east coast, *Colenso*. **Middle Island:** Akaroa, *Raoul*. Also a native of Tasmania and South-East Australia.

## 21. CATABROSA, Palisot.

Tufted, glabrous, erect grasses.—Spikelets paniced, 2-flowered, scarious, shining. Empty glumes 2, short, unequal, awnless, convex at the back; flowering ones concave, truncate, erose, herbaceous, awnless, lower sessile, upper pedicelled. Pale 2-nerved. Scales 3. Stamens 3. Grain glabrous, free.

A small genus of temperate climates, not hitherto found in Australia or Tasmania.

1. **C. antarctica**, Hook. f. *Fl. N. Z.* i. 308. t. 56. Culms decumbent, very slender, 6-12 in. high, branched below, leafy. Leaves involute, longer than the culms, slender, almost filiform; ligule long, narrow, membranous; sheaths deeply furrowed. Panicle very slender, erect, contracted, 1-2 in. long; branches few, slender. Spikelets very few, small, flat, white, glistening,  $\frac{1}{12}$  in. long. Empty glumes unequal, acute; flowering ones convex with an obtuse jagged tip, slightly webbed at the base; nerves obscure. Anthers broad, short.—*Fl. Antart.* i. 102. t. 56.



**Northern** Island: summit of the Ruahine range, *Colenso*. **Campbell's** Island, on rocky ledges, *J. D. H.*

## 22. POA, Linn.

Creeping or tufted, soft (rarely harsh rigid or pubescent), often tall grasses. Panicle usually open, with whorled lower branches.—Spikelets green, herbaceous, pedicelled, 2–10 (rarely 1-) flowered. Empty glumes equal or unequal, compressed, keeled, acuminate, awnless, margin often membranous; flowering ones distant on a glabrous or villous rachis, upper often imperfect, compressed, keeled, obtuse acute or acuminate (never awned), glabrous or scabrid, naked or webbed at the base; edges often membranous. Pale 2-nerved, 2-fid. Scales 2. Stamens 2 or 3. Grain glabrous, free, rarely adherent to the pale.

A very large genus in all temperate and cold regions; the species are always most puzzling and difficult to discriminate from one another, and many may be put with *Festuca*, except for habit. *P. foliosa* thus approaches forms of *F. littoralis* very closely, but is an evident congener of *P. ramosissima* and others. *Kœleria* hardly differs when not awned, except in habit and the texture of the glumes.

*Empty glumes not half the length of the flowering. (Leaves slender, flaccid. Spikelets  $\frac{1}{2}$  in. long.)*

Spikelets few. Flowering glumes oblong, obtuse; nerves faint . . . 1. *P. imbecilla*.  
Spikelets many. Flowering glumes, acuminate, nerved . . . 2. *P. breviglumis*.

*Empty glumes more than half as long as the flowering.*

*Flowering glumes acuminate.*

Panicle open. Culms naked below, rigid, branched. Leaves flaccid . . . 3. *P. ramosissima*.  
Panicle open. Culms leafy from the base. Leaves coriaceous . . . 4. *P. foliosa*.

*Flowering glumes obtuse.*

Culms very minute, tufted. Spikelets few, nearly sessile . . . 5. *P. exigua*.  
Culms stout. Leaves coriaceous, flat or concave; ligule truncate . . . 6. *P. anceps*.  
Culms slender, polished. Leaves filiform; ligule 0 . . . 7. *P. australis*.  
Culms slender. Leaves filiform or subulate; ligule membranous . . . 8. *P. Colensoi*.  
Culms 2–4 in., slender. Leaves short, narrow, flat, green; ligule short . . . 9. *P. Lindsayi*.

1. ***P. imbecilla*, Forst.**;—*Fl. N. Z.* i. 306. Culms weak, flaccid, decumbent, spreading, very slender, sometimes capillary, 6–12 in. long. Leaves very narrow,  $\frac{1}{30}$ – $\frac{1}{20}$  in. broad, flat, green; ligule membranous, short. Panicle very lax, open, elongate, with few alternate or 2-nate long capillary branches. Spikelets 1 or 2 on each branch, minute,  $\frac{1}{2}$  in. long, green, 3–8-flowered. Empty glumes unequal, obtuse; flowering ones twice as long, remote, oblong, obtuse, glabrous, obscurely 3-veined, not webbed at the base.—*P. Sprengelii*, Kunth, according to Raoul, and probably *P. implexa*, Trinius, *P. australis*, Sieber, and *P. Sieberiana*, Sprengel.

**Northern** Island: abundant in woods, etc. **Middle** Island: probably also common, but overlooked; Milford Sound, *Lyall*. Also a native of Australia, but not of Tasmania. I have seen no specimens of Forster's plant, to which A. Cunningham first referred this. Banks and Solander referred the following to Forster's *P. imbecilla*.

2. ***P. breviglumis*, Hook. f. *Fl. Antarct.* i. 101.** Quite glabrous. Culms flaccid, slender, decumbent and much-branched below, 6–12 in. long, leafy. Leaves shorter than the culms, flat, very slender, flaccid,  $\frac{1}{20}$ – $\frac{1}{12}$  in.

broad; ligule oblong. Panicle lax, oblong, 3–5 in. long; branches in pairs or threes, capillary, suberect, with 2 or 3 pedicelled, green, 3- or 4-flowered spikelets  $\frac{1}{2}$  in. long towards their tips. Empty glumes small, very unequal, oblong, obtuse, lower half the length of the flowering glume or shorter, upper larger; flowering glumes oblong or lanceolate, obtuse or acute, on nearly glabrous pedicels, green, strongly 3–5-nerved.

**Northern Island, Banks and Solander.** **Middle Island:** Akaroa, *Raoul*; Saddle Hill, Otago, *Lindsay*. **Campbell's Island**, grassy places near the sea, *J. D. H.* This differs from *P. imbecilla*, of which it may be a variety, in its stouter habit, the larger size of all its parts, and more acute flowering glumes, with much stronger nerves. The outer empty glume is shorter in Campbell's Island than in any New Zealand specimens, and sometimes toothed at the tip.

3. ***P. ramosissima*, Hook. f.**;—*Fl. Antarct.* i. 101. Culms densely tufted, forming naked, rigid, brown, branching, decumbent stems, 6–10 in. long, from which much-divided, flaccid, very leafy, slender branches, 2–6 in. long, ascend. Leaves most numerous, very narrow, flaccid, flat,  $\frac{3}{8}$  in. broad, much longer than the culms; ligule oblong, truncate; sheaths slender. Panicle 1–2 in. long, narrow, green; branches quite glabrous, smooth, very short,  $\frac{1}{4}$  in. long, interrupted. Spikelets  $\frac{6}{8}$  in. long, very shortly pedicelled, glabrous, green, 3–5-flowered. Empty glumes lanceolate, acuminate, 3-nerved, nearly equal, as long as the flowering, which are narrower, glabrous, acuminate with incurved tips, obscurely 5-nerved, pedicel glabrous or a little webbed.

**Lord Auckland's group and Campbell's Island**, abundant everywhere, *J. D. H.* A grass of remarkable habit, from the long, naked, decumbent bases of the culms, which are excessively branched and leafy above.

4. ***P. foliosa*, Hook. f.**—*Festuca foliosa*, *Fl. N. Z.* i. 308. Culms stout, tufted, short or tall, 1–3 ft. high. Leaves flat, glabrous, coriaceous, shorter or longer than the culms,  $\frac{1}{2}$ – $\frac{3}{4}$  in. broad; ligule short, membranous; sheaths compressed. Panicle rather dense, oblong or ovate, inclined, 1–10 in. long; branches short, nearly glabrous, erect. Spikelets large,  $\frac{1}{8}$ – $\frac{1}{2}$  in. long, much compressed, green or purplish, 4–8-flowered, very shortly pedicelled. Empty glumes lanceolate, acuminate, tips often slightly incurved, as long as the flowering glumes, which are broader, acuminate, tips incurved, much compressed, slightly scabrid or glabrous, keel smooth or ciliate, pedicel webbed.

Var. *a*. Culms 2–3 ft. high, very leafy. Leaves longer than the culm. Panicle 6–10 in. long. Empty glumes longer in proportion to the spikelet.—*Festuca foliosa*, *Fl. Antarct.* i. 99. t. 55.

Var. *β*. Culms 6–12 in. high, leafy at the base only. Leaves much shorter than the culms. Panicle 1–6 in. long. Spikelets larger in proportion to the glumes.

**Lord Auckland's group and Campbell's Island:** var. *a*, common near the sea and on the hills. **Middle Island:** var. *β*, Milford Sound, *Lyall*; Southern Alps, *Sinclair*, *Haast*, and *Travers*; snow holes on Mount Darwin and Richardson glacier, alt. 4–6500 ft.; Otago, lake district, *Hector* and *Buchanan*. The very acute glumes with the tips usually more or less inclined to be incurved, well distinguish this from all but *P. ramosissima*. Some of Haast's and Hector's specimens have spikelets very large and broad.

5. ***P. exigua*, Hook. f. n. sp.** A very minute, tufted, glabrous, flaccid species, 1–1½ in. high. Leaves involute, erect, subulate, obtuse,  $\frac{1}{2}$ – $\frac{3}{8}$  in. long, sheaths membranous; ligule 0, or very short. Panicle almost reduced to an erect raceme,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, narrow, of few shortly-pedicelled, purplish, broadly

ovate spikelets  $\frac{1}{2}$  in. long. Empty glumes obovate-oblong, very obtuse, purple, with broad membranous margins; upper nearly as long as the flowering, lower shorter; flowering glumes nearly orbicular when spread out, quite glabrous, purplish, with broad white margins, 5-nerved.

**Middle Island:** lake district, alpine, *Hector and Buchanan*. Apparently a very peculiar little plant, and quite unlike any *Poa* known to me, but considering that I have it but from one locality, and how variable its congeners are, I am by no means confident of its not proving a reduced form of perhaps *P. breviglumis*.

6. ***P. anceps*, Forst.;**—*Fl. N. Z.* i. 306. Culms rather stout, tufted, leafy, tall or short, smooth,  $\frac{1}{2}$ –3 ft. high, glabrous, often compressed at the base, simple or branched. Leaves distichous, coriaceous, strict or flexuous, flat or concave, longer or shorter than the culm; ligule coriaceous, very short. Panicle inclined, 1–12 in. long, ovate or lanceolate, effuse or contracted; branches whorled, long, slender, capillary (short or 0 in var.  $\gamma$ ,  $\delta$ ,  $\epsilon$ ). Spikelets  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, usually broad and flat, 1–6-flowered, green, rarely white. Empty glumes as long as the flowering, narrow, acute, glabrous or scabrid; flowering narrow, oblong, obtuse, scaberulous (smooth in var.  $\epsilon$ ), crowded or distant, webbed or naked at the base, 5-nerved.—*P. australis*, A. Cunn. not Br.

Var.  $\alpha$ . *elata*. Culms 2–3 ft. Leaves  $\frac{1}{4}$  in. broad. Panicle 4–8 in. long; branches long, slender. Spikelets  $\frac{1}{2}$ – $\frac{3}{4}$  in. Glumes spreading.

Var.  $\beta$ . *foliosa*. Culms much branched, 1–2 ft. Leaves numerous, strict. Panicle more contracted; branches long, slender. Spikelets smaller. Glumes broader, flowering 1–5, close together.—*P. affinis*, Br.;—*Fl. N. Z.* i. 307.

Var.  $\gamma$ . *breviculmis*. Culms 4–10 in. high, stout, short, compressed, leafy at the base only. Leaves 2–3 in. long, curved. Panicle ovate, contracted. Spikelets short, obtuse, 3- or 4-flowered. Glumes broad, rather acute, flowering close together.

Var.  $\delta$ . *densiflora*. Culms 1–2 ft. Leaves 4–12 in., concave. Panicle 2–4 in., dense; branches very short, densely covered with 4–6-flowered spikelets.

Var.  $\epsilon$ . *alpina*. Culms 6–8 in. Leaves 1–2 in., involute. Panicle much contracted, 1–2 in. long; branches very short. Spikelets short, glabrous, shining, white, 2–4-flowered (perhaps a different species).

Abundant in woods and open places; var.  $\alpha$ , in the **Northern Island** chiefly; var.  $\beta$ , in both islands; var.  $\gamma$ , in dry pastures; var.  $\epsilon$ , Southern Alps, snow holes on Mount Darwin, ascending to 6000 ft. on Mount Dobson, *Haast*. This is the common *Poa* of New Zealand, and is the same as a New South Wales plant, which I take to be Brown's *P. affinis*, and of which some states appear in that country to run into *P. australis*. Of Forster's *Poa cæspitosa* I find no specimens in the British Museum, but can scarcely doubt that it is a form of this or the following species.

7. ***P. australis*, Br., var. lævis;**—*Fl. N. Z.* i. 307. Culms densely tufted, perfectly smooth, polished, slender, pale yellow when dry, 6–36 in. high. Leaves shorter than the culms, very slender, filiform, involute, erect, rigid; sheaths polished, smooth and shining; ligule 0. Panicle 1–4 in. long, ovate in outline, very lax; branches few, capillary, spreading, with few, pedicelled, pale, 4–6-flowered spikelets  $\frac{1}{2}$ – $\frac{1}{4}$  in. long, on each. Empty glumes scabrid, nearly equal, acute, shorter than the flowering, which are scaberulous, oblong-lanceolate, obtuse, webbed at the base.—*P. lævis*, Br.

**Northern Island:** dry plains, Taupo, Motukino, and woods at Tarawera, *Colenso*. **Middle Island:** abundant in upland and dry lowland situations. Intermediates between this and *P. anceps* may occur, but in their ordinary states the two plants are widely different, especially in habit. The absence of ligule at once distinguishes some forms of this from *P. Colensoi*.

8. **P. Colensoi**, *Hook. f., n. sp.* Habit, colour, and foliage of *P. australis*, but usually not more than 1-6 in. high, and generally 6-8. Leaves the same, but the sheaths always very rigid, grooved, and coriaceous, terminating abruptly in a very large, white, membranous, sheathing ligule. Panicle 1-2 in. long, broadly ovate, of few, lax, capillary, spreading branches, each bearing 1 or 2 broad, flat spikelets, exactly as in *P. australis*. Flowering glumes webbed at the base, and sometimes villous at the back.

**Northern** Island: Taupo plains, and top of the Ruahine mountains, *Colenso*. **Middle** Island: Upper Awatere and Aglionhy plains, *Sinclair, Munro, and Travers*; Hopkins river and Rangitata range, alt. 1500-2500 ft., *Sinclair and Haast*; Otago, lake district, alpine, *Hector and Buchanan*, a very small variety, 1-2 in. high, with much reduced panicle, and flowering glume villous at the back. So similar to *P. australis*, that I long confounded them, and am far from persuaded of their permanent differences; the large, white, sheathing ligules of this are, however, a most curious character.

9. **P. Lindsayi**, *Hook. f., n. sp.* Culms numerous, densely tufted, erect, very slender, 3-5 in. high. Leaves  $\frac{1}{2}$ -2 in. long, flaccid, involute, subulate, green,  $\frac{1}{10}$  in. diam.; sheaths very short; ligule oblong. Panicle lax, open, 1-2 in. long, ovate; branches 2- or 3-nate, horizontal, capillary, smooth, flexuous, lower  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, bearing 1-3 subterminal, ovate, compressed, spreading, 4-6-flowered, brown-green spikelets  $\frac{1}{12}$ - $\frac{1}{8}$  in. long. Empty glumes nearly equal, oblong, subacute, as long as the flowering, which are similar, subacute, glabrous, nerveless; keel scabrid; rachis glabrous. Pale with scabrid nerves.

**Middle** Island: Otago, slopes of Saddle Hill, *Lindsay*; lake district, *Hector and Buchanan*; Canterbury, Acheron valley, alt. 4000 ft., *Travers*; Kowai valley, in crevices of rocks, alt. 2-3000 ft., *Haast*. A beautiful little species, of which all the specimens I have entirely agree in size, habit, and characters; it may be known by the densely-tufted habit, small, flat, narrow, green leaves, numerous capillary culms, broad, lax, open panicle, and spikelets like *P. imbecilla*, but the outer glumes very different.

*P. annua*, the commonest of English Grasses, is found by roadsides, etc.; it is a weak, flaccid grass, with flat, soft leaves, large membranous ligules, and green webbed glumes, like those of *P. anceps*, var.  $\gamma$ . *P. nemoralis*, Linn., *P. compressa* and *P. pratensis*, Linn., may also be expected to occur in New Zealand pastures, etc.

### 23. FESTUCA, Linn.

Tufted, often rigid or harsh, leafy grasses. Spikelets paniced racemed or spiked, pedicelled, 2- or more-flowered, green or pale, coriaceous, and usually rigid; rachis often jointed. Empty glumes 2 (rarely 1), unequal, acute, convex at the back; flowering ones convex at the back, acute, acuminate or awned at the tip, rarely minutely 2- or 3-toothed at the tip, naked or webbed at the base. Pale 2-nerved. Scales 2, acutely 2-fid. Stamens 1-3. Grain free or adherent to the pale, glabrous.

A very extensive genus in all temperate and mountainous countries, of which the species are as variable as those of *Poa*, and the two first are hardly generically distinguishable from that genus.

*Glumes awnless.*

Culms branched, 2-3 ft., rigid. Spikelets turgid . . . . . 1. *F. littoralis*.

Culms simple, 6-24 in. Spikelets compressed . . . . . 2. *F. scoparia*.

*Glumes awned.*

Culms very slender. Panicle effuse . . . . . 3. *F. duriuscula*.



1. **F. littoralis**, Br.;—*Schenodorus littoralis*, Palisot;—Fl. N. Z. i. 310. A tall, rigid, perennial, densely tufted, perfectly smooth, much branched, polished grass. Culms 2–3 ft. high, leafy. Leaves erect, involute, terete, pungent, longer or shorter than the culm; ligule very short or 0. Panicle 3–10 in. long, slender, rarely pale; branches short, erect. Spikelets broad, turgid, 4–7-flowered,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, longer than the glumes. Empty glumes acuminate, glabrous; flowering ones longer, pubescent, 5-nerved, naked or webbed at the base, keeled, acute, obtuse or 3-toothed at the tip.—*Poa littoralis*, Labill. Fl. Nov. Holl. i. 22. t. 27; *Arundo triodioides*, Trinius.

**Northern Island**: abundant on rocks near the sea, *Banks and Solander*, etc.; East Cape, on sandhills, *Colenso*. Also a native of Tasmania and Australia.

2. **F. scoparia**, Hook. f. *Fl. Antarct.* i. 98; *Fl. N. Z.* i. 308. Densely tufted, 6–24 in. high, smaller than *F. littoralis* in all its parts, perfectly glabrous, polished, and shining. Leaves filiform, rigid, longer or shorter than the culm. Panicle  $\frac{1}{2}$ –2 in. long, ovoid or narrow-elongate and few-flowered; branches short, erect. Spikelets flattened,  $\frac{1}{5}$ – $\frac{1}{3}$  in. long. Empty glumes acuminate, shorter than the flowering, which are much webbed at the base, acuminate at the tip.

**Northern Island**: Auckland, *Sinclair*. **Middle Island**: Port William, *Lyall*. **Lord Auckland's** group and **Campbell's** Island: common in rocky places near the sea, *J. D. H.* I suspect that the Kerguelen's Land *Poa* (*Triodia*) *kerguelensis* is a starved form of this.

3. **F. duriuscula**, Linn.;—*Fl. N. Z.* i. 309. Very slender, densely tufted, glabrous. Culms 1–3 ft. high, leafy at the base chiefly. Leaves slender, involute, filiform or short and setaceous. Panicle 1–6 in. long, effuse or contracted; branches capillary, often flexuous, lower 2- or 3-nate. Spikelets few, 4–8-flowered,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long. Empty glumes unequal, acute; flowering ones naked at the base, narrow-lanceolate, remote, scabrid, acuminate; terminating in a short, stiff awn.

**Northern Island**: in mountainous districts, Hawke's Bay, Wairarapa valley, Cape Turnagain, etc., *Colenso*. **Middle Island**: abundant on the Alps, from Nelson to Otago, ascending to 4000 ft. A most common European grass, forming much of the mountain pasture; also found in Tasmania, Fuegia, and almost all temperate mountainous regions.

**F. bromoides**, Linn.;—*Fl. N. Z.* i. 309, is certainly an introduced plant, and nowhere native; it may be recognized by its annual, extremely slender culms, 4–8 in. high, setaceous, involute, erect leaves, racemed or almost spiked spikelets, with 3–10 flowers; empty glumes very unequal, flowering ones ending in long slender awns. A most abundant European grass, introduced into all temperate parts of the southern hemisphere.

## 24. BROMUS, Linn.

Annual or perennial grasses. Leaves usually flat.—Spikelets paniced or racemed, many-flowered. Empty glumes 2, concave, convex at the back, not awned, rigid; flowering ones lanceolate, convex at the back, 2-fid, awned from between the lobes, not twisted, often recurved.—Pale 2-nerved; nerves ciliated. Scales 2, entire. Stamens 3. Ovary hairy at the top; styles generally distinct. Grain free, top hairy.

A very large genus found in all temperate countries.

1. **B. arenarius**, Lab.;—*Fl. N. Z.* i. 310. Annual, densely pubescent

or villous all over. Culms 3-24 in. high, leafy. Leaves flat, villous on both surfaces. Panicle 3-8 in. long, nodding, branches slender, 3-5-nate, spreading. Spikelets green, 1 in. long, on slender pedicels, villous, 5-7-flowered. Empty glumes lanceolate, long acuminate, much shorter than the flowering ones, tips and margins membranous; flowering glumes ciliate, narrow-lanceolate, strongly 7-nerved, 2-fid at the tip; awn as long as the glume.—Labill. Fl. Nov. Holl. i. 23. t. 28; *B. australis*, Br.; A. Cunn. Prodr.

**Northern** Island: rocky places near the sea, Bay of Islands, *Cunningham*; east coast, *Colenso*, etc. Also a native of Australia, but not of Tasmania; it is allied to the European *B. tectorum*, L.

Of introduced species, *Bromus mollis*, Linn., a small species with short ovoid panicles, and tumid villous spikelets, and broad glumes with short awns, has been gathered in the Achéron valley by Travers, alt. 4000 ft.

*B. racemosus*, Linn., a similar species, with glabrous spikelets, is introduced near Dunedin, Otago.

## 25. TRITICUM, Linn.

Annual tufted or perennial creeping grasses. Leaves involute or flat.—Spikelets spiked, usually jointed at the base, on alternate sides of an unjointed compressed rachis, sessile, parallel to the long axis of the rachis, 3-many-flowered. Empty glumes 2, often unequal, rigid, concave, keel often scabrid; flowering ones hard and coriaceous, obtuse acute or awned, concave, keel ciliate. Pale 2-nerved; nerves ciliate at the back. Scales 2, entire, often ciliated. Stamens 3. Ovary hairy at the top; styles distinct. Grain free, or adhering to the pale, hairy at the top.

A very large European and Oriental genus, also found in most temperate countries, to which the cultivated Wheat belongs.

Spikelets 8-16-flowered. Awns short . . . . . 1. *T. multiflorum*.

Spikelets 6-10-flowered. Awns thrice as long as the glume, slender . . . 2. *T. scabrum*.

Spikelets 4-6-flowered. Awn  $1\frac{1}{2}$ -2 in. long, five times as long as the glume, rigid, channelled, very stout . . . . . 3. *T. Youngii*.

1. **T. multiflorum**, *Banks and Sol.*;—*Fl. N. Z.* i. 311. Culms annual, slender, tufted, erect or prostrate below, 1-4 ft. high, striate, quite glabrous. Leaves 4-8 in. long, flat, rough on the upper surface. Spike 3-10 in. long. Spikelets 6-12, 8-16-flowered,  $\frac{1}{4}$ - $1\frac{1}{2}$  in. long. Empty glumes linear-lanceolate, unequal, acuminate, nerved; flowering ones much longer,  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, smooth, nerveless and pale below, green and nerved above; awn very short, rigid, scabrid.—*T. scabrum*, A. Cunn. Herb. not Br.; *T. repens*, A. Rich. Flora<sup>?</sup>, not Linn.

**Northern** and **Middle** Islands: abundant, *Banks and Solander*, etc.; Cape Palliser, and elsewhere on the east coast and interior, *Colenso*; Auckland, *Sinclair*. Closely allied to the European *T. repens*, but annual.

2. **T. scabrum**, *Br.*;—*Fl. N. Z.* i. 311. Culms very variable, annual, tufted, slender, 3 in. to 3 ft. high, smooth. Leaves 1-4 in. long, flat or involute, usually scabrid on both surfaces. Spike 4-6 in. long. Spikelets 2-8 (rarely 1), with the awns  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, 6-10-flowered. Empty glumes lanceolate, often small, nerved, lower truncate; flowering as in *T. multiflorum*, but the awn is 3-5 times as long as the glumes, flexuous straight or recurved.

—*T. squarrosum*, Banks and Sol.; *Festuca scabra*, Labill. Fl. Nov. Holl. i. t. 26.

**Northern and Middle Islands:** common in dry ground, *Banks and Solander*, etc.; ascending to 3000 ft. on the Hopkins, *Haast*. This may pass into the preceding, but the two plants are so different in their ordinary states that I hesitate to unite them. The present is abundant in Australia and Tasmania, and apparently the same is found in central Asia, Abyssinia, and Persia. Travers says that it is a most valuable fodder grass, growing freely up to 6000 ft., and ravenously eaten by all kinds of cattle.

3. **T. Youngii**, *Hook. f.* Habit of *T. scabrum*. Leaves quite glabrous below, slightly scabrid on the upper surface. Spike 2–3 in. long, of 3 or 4 very large spikelets 4 in. long, including the awns. Empty glumes  $\frac{1}{2}$  in. long, acuminate, margins membranous; flowering ones nearly  $\frac{3}{4}$  in. long without the awn, which is  $1\frac{1}{2}$ –2 in. long, very stout, rigid, scabrid, concave at the back, concave in front with scabrid edges, margin and sides of glumes scabrid and almost aculeate.

**Middle Island:** grassy flats, sources of the Waitaki, alt. 3000 ft., *Haast*. A remarkable plant, with few spikelets, almost twice as large as those of *T. scabrum*, and very long rigid awns. My specimens are imperfect, and some allowance must here be made for the description.

The Wheat, *Triticum vulgare*, Linn., is no doubt often found as an escape from cultivation, as is its ally the Barley, *Hordeum sativum*, L. The common *H. murinum*, Linn., of European roadsides, is also naturalized in Otago.

*Lolium perenne*, Linn., *temulentum*, Linn., and *arvense*, With., all common European "Rye-Grasses," are found occasionally near cultivation: the genus is known from *Triticum* by its solitary empty glume.

## 26. GYMNSTICHUM, Schreber.

Characters of *Triticum*, but the outer empty glumes are absent or represented by a pair of rigid bristles, and 1–3-flowered; flowering glumes on a flattened rachis, seated on thickened calli.

The only other described species is a native of the United States.

1. **G. gracile**, *Hook. f.*, *Fl. N. Z.* i. 312. t. 70. Perennial?, slender, erect, 3–4 ft. high, smooth. Leaves narrow, flat, upper surface rough, sheaths smooth. Spike 4–8 in. long, very slender, inclined; rachis flat, flexuous, edges ciliate. Spikelets 20–30, lax, sessile, solitary,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long with the awns, 1–3-flowered. Empty glumes 0 or replaced by 2 persistent bristles; flowering 1–3, distant on a flattened rachis, each with a callus at its base, upper imperfect, lower shortly pedicelled, all lanceolate, 5-nerved, scabrid; awn straight, shorter than the glume. Scales 2-lobed, ciliate. Ovary villous; styles remote at the base.

**Northern Island:** woods at Patea and Tarawera, *Colenso*. **Middle Island:** Akaroa, *Raoul*; Otago, lake district, *Hector and Buchanan*. A very curious grass, closely allied to the North American *A. hystrix*, which has usually the spikelets in pairs, and the empty glumes deciduous; I have described the empty glumes as sometimes replaced by two rigid persistent bristles; these I take to be rudimentary spikelets.

The following grasses, which I find described as natives of New Zealand, are unknown to me, nor can I guess what they are.

*Kampmannia Zeelandica*, Steud. Synops. Gram. 35. Very imperfectly described, no habitat nor collector's name given. It is placed next to *Hystericina*, Steud., which I have referred to *Echinopogon* (p. 325).

*Eragrostis eximia*, Steud. l. c. 279, a New Holland tropical grass, allied to *Poa*, but with 6-12 flowering glumes; has never, that I am aware of, been found in New Zealand.

*Stenostachys narduroides*, Turcz. in Bull. Soc. Nat. Hist. Mosc. 35. t. ii. 331. As with *Staphylorhodos* (p. 57), so with this, all I can say is, that I know of no plant like it in New Zealand, nor does any such occur in Sir E. Home's original collections in the British Museum. Can it be *Triticum* badly described?

### CLASS III. CRYPTOGRAMIA.

#### ORDER I. FILICES.

Herbs, rarely half-shrubby or arboreous plants, with fibrous roots, or most frequently with a perennial *rhizome*.—Rhizome short, stout, either forming an erect woody trunk, or prostrate, or slender and climbing, or creeping. Branches (*fronds*), tufted at the end of the rhizome or alternate upon it, continuous with it or jointed on to it, simple or more often pinnatifidly pinnately or 2- or 3-pinnately divided, the lower stalk-like portion (*stipes*) usually grooved on the upper side, as is its continuation (*rachis*); the fronds are sometimes of two kinds, barren and fertile (*Lomaria*, *Niphobolus*, etc.), at others the fertile portion of the frond is very distinct from the rest (*Ophioglossum*, *Botrychium*, *Osmunda*). Fructification consisting of microscopic *spores*, contained in minute *capsules* of various forms, usually placed on the under surface of the frond, but sometimes arranged in spikes or panicles. Capsules in most of the genera very minute, membranous, collected into brown masses (*sori*), often mixed with jointed hairs or imperfect club-shaped capsules, bursting by a transverse or longitudinal fissure; in a few genera at the end of the Order the capsules are much larger, coriaceous, either connate into 2-valved masses which open by pores (*Marattia*), or into a long spike (*Ophioglossum*), or are sessile and free on the branches of a panicle (*Botrychium*). Sori of various forms, globose oblong or linear; at the back or edge of the frond; on the tips or middle of the veins; naked or covered by the recurved edge of the frond, or by a special involucre (also called *indusium*); sessile or on a short or long, sometimes filiform (*Trichomanes*) *receptacle*. Involucre formed of the recurved edge of the frond, or of a scale attached by its centre base or sides to the side or centre of the sorus, membranous or coriaceous, simple or double, sometimes 2-lipped or 2-valved, one lip being the recurved edge of the frond. Spores usually obtusely 3-gonous, smooth or granular.

A very large, difficult, polymorphous and variable Order of plants, found in almost all quarters of the globe, but most abundant and beautiful in damp southern, tropical and temperate insular localities, where also the species attain their greatest size. To the above characters of the Order may be added, that the fronds of almost all are circinate or coiled inwards like the top of a crozier when young; but this character does not hold good in the tribe *Ophioglosseæ*. Its mode of propagation is very curious; the microscopic spore (contained in the minute capsule), when it falls in a suitably damp place, bursts, and produces from its contents a minute, flat, green, membranous, cellular scale (*prothallium*) on the under-surface of which two kinds of organs appear, male and female. The male (*antheridia*) consist of cells



(*sperm-cells*) containing spiral ciliated bodies endowed with active motion (*spermatozoids* or *antherozoids*); the female of cavities (*archegonia*), containing each a solitary free cell (*germ-cell*) at its base. Somehow, probably by the agency of water, one or more spermatozoids finds its way into the archegonium, and fertilizes the free cell at its base. The free cell forthwith begins to send rootlets downwards and a stem upwards, and becomes a Fern, the prothallium thereon withering away. To observe these parts and processes requires a good microscope; but the production of the prothallium may be easily observed by causing spores to germinate on damp earth under a tumbler.

Of the 120 Ferns described here, 104 were in the 'New Zealand Flora,' of the rest 3 were there considered as varieties or not properly discriminated, and the rest are new discoveries or additions from Lord Auckland's and Kermadec Islands. Of the whole number, 45 species and 1 genus are peculiar to the islands, 69 are common to Australia and Tasmania, and 9 to Britain. I have followed the 'Species Filicum' throughout in the sequence of the genera and species, as well as in the difficult matter of their limitation, feeling satisfied that it is, on the whole, far the best hitherto proposed.

I have given two Keys to guide the student to the determination of the genera of this very difficult Order. The most important characters of the natural arrangement are derived from the form and markings of the minute capsules, which cannot be detected without a strong lens and some practice.

### 1. ARTIFICIAL KEY TO THE GENERA.

1. Fructification on a long stipes, apart from leaf-like portion of the frond:—Tribe VIII. OPHIOGLOSSÆ.

2. Fructification forming distichous spikelets which terminate the fronds or project from their surface:—Tribe VI. SCHIZÆACEÆ.

3. Fructification on the back or edges of the frond.

a. Fructification of hard 2-valved bodies which open by parallel slits on the inner faces of the valves:—29, MARATTIA.

β. Fructification of minute, reticulated, sessile or stalked capsules, collected into clusters (*sori*) of various shapes, bursting vertically or transversely.

§ Capsule-bearing fronds differing from the barren:—16, LOMARIA; *Polypodium rupestre*, *Doodia caudata*.

§§ Fronds all similar.

† Sori dorsal. Receptacle elevated. Usually tree-ferns:—Tribe II. CYATHEACEÆ.

†† Stem not arboreous. Frond with whorled or dichotomous branches, with buds in the axils:—1. GLEICHENIA.

††† Stem not arboreous. Receptacle not elevated. Frond simple or pinnately or pinatifidly branched.

‡ Sori marginal, covered with an involucre. Capsules sessile on a long receptacle, with an oblique or horizontal ring:—Tribe III. HYMENOPHYLLÆ.

‡‡ Sori marginal, covered with an involucre. Capsule stalked, with a vertical dorsal ring:—10, LINDSÆA; 11, ADIANTUM; 12, HYPOLEPIS; 13, CHEILANTHES; 14, PELLÆA; 15, PTERIS; various species of 19, ASPLENIUM; 24, NOTOCHLÆNA.

‡‡‡ Sori distant from the margin of the frond, globose or punctiform:—8, CYSTOPTERIS; 9, DAVALIA; 19, ASPIDIUM; 20, NEPHRODIUM; 21, NEPHROLEPIS; 22, POLYPODIUM.

‡‡‡‡ Sori distant from the margin of the frond, linear or oblong:—(1) Involucrate: 17, DOODIA; 18, ASPLENIUM. (2) Involucres 0: 22, POLYPODIUM *Grammitides*, var. *australis*; 23, GYMNOGRAMME; 24, NOTOCHLÆNA.

### KEY TO THE NATURAL ARRANGEMENT OF THE GENERA.

I. Capsules very minute, membranous, reticulated, bursting by an irregular transverse or longitudinal fissure, collected in brown masses or sori on the edge or back of the frond.

TRIBE I. **Gleicheniaceæ.** Capsules 1-6, sessile, bursting longitudinally, completely girt by a transverse or oblique striated ring.

Rhizome creeping. Fronds rigid, coriaceous. . . . . 1. GLEICHENIA.

**TRIBE II. Cyatheaceæ.** *Capsules numerous, sessile or stalked, forming a globose sorus, placed on an elevated receptacle, often mixed with jointed hairs, bursting transversely, half girt by a vertical striate ring.—Coriaceous Ferns; trunks arborescent in the New Zealand species.*

- Involucre globose, first enclosing the capsules, then bursting irregularly and leaving a cup with toru edges . . . . . 2. **CYATHEA.**  
 Involucre 0 . . . . . 3. **ALSOPHILA.**  
 Involucre 2-valved, outer of the concave recurved tip of the frond, the inner concave, placed on the tip of a vein . . . . . 4. **DICKSONIA.**

**TRIBE III. Hymenophyllaceæ.** *Sori on the edges of the frond. Capsules sessile, on a clavate or filiform, often very long receptacle, girt by a horizontal or oblique complete striate ring.—Fronds usually very delicate, membranous, transparent (coriaceous and rigid in Loxsoma and Trichomanes Malingii). Involucre 2-valved, or urceolate or campanulate; veins very rarely branched in the segments.*

- Frond membranous. Involucres 2-valved . . . . . 5. **HYMENOPHYLLUM.**  
 Frond usually membranous. Involucres tubular, urceolate or campanulate, 2-lipped . . . . . 6. **TRICHOMANES.**  
 Frond coriaceous, opaque. Involucres urceolate, mouth truncate . . . . . 7. **LOXSOMA.**

**TRIBE IV. Polypodiaceæ.** *Sori on the edges or back of the frond. Capsules not raised on an elevated receptacle, stalked, furnished with an incomplete, vertical, dorsal, striate ring, bursting transversely where the ring is absent.*

*A. Sori covered with a more or less evident involucre.*

§ 1. *Sori globose, not on the edge of the frond. Involucre ovate or saccate, opening outwards. (§ 5, ASPIDIEÆ, differ in the involucre inserted by a point only.)*

- Involucre attached by its base to the middle of a vein, membranous . . . . . 8. **CYSTOPTERIS.**  
 Involucre attached by its base and sides to the tip of a vein . . . . . 9. **DAVALLIA.**

§ 2. *Sori linear or oblong, close to or upon the edge of the frond. Involucre opening outwards. . . . .* 10. **LINDSÆA.**

§ 3. *Sori linear or globose, on the edge of the frond. Involucre continuous with the edge of the frond, opening inwards. (See some Asplenias, in § 4.)*

- Sori globose or oblong. Involucre reniform, of different texture from the frond . . . . . 11. **ADIANTUM.**  
 Sori globose. Involucre formed of the green incurved tip of the segment of the frond . . . . . 12. **HYPOLEPIS.**  
 Sori globose, confluent or linear. Involucre formed of the continuously inflexed margin of the frond (see NOTHOCHLÆNA, in B) . . . . . 13. **CHEILANTHES.**  
 Sori continuous. Involucre continuous round the pinnæ, finally recurved. Frond simply pinnate . . . . . 14. **PELLÆA.**  
 Sori and involucre as in PELLÆA, but the latter recurved. Frond 2- or 3-pinnate . . . . . 15. **PTERIS.**  
 Sori linear. Involucre as in PTERIS, but sometimes intramarginal, and fertile fronds different from the barren . . . . . 16. **LOMARIA.**

§ 4. *Sori linear or oblong, distant from the margin, except in some Asplenias. Involucre membranous, linear or oblong, opening towards the costa.*

- Sori parallel to the costa. Involucre attached to confluent veins . . . . . 17. **DOODIA.**  
 Sori linear or oblong, usually oblique to the costa. Involucre membranous, attached laterally to a free vein. (Sori marginal in much-divided species.) . . . . . 18. **ASPENIUM.**

§ 5. *Sori globose, distant from the margin. Involucre orbicular or reniform, attached by a point.*

- Involucre orbicular, peltate. Frond compound . . . . . 19. **ASPIDIUM.**  
 Involucre reniform. Frond very compound . . . . . 20. **NEPHRODIUM.**  
 Involucre reniform. Frond simply pinnate . . . . . 21. **NEPHROLEPIS.**

B. *Sori naked, without any involucre.*

- Sori separate, globose, rarely oblong . . . . . 22. **POLYPODIUM.**  
 Sori linear or oblong, usually confluent, often in branching lines . . . 23. **GYMNOGRAMME.**  
 Sori continuous near the margin, sometimes partially covered by  
 the recurved edge of the frond . . . . . 24. **NOTHOCHLÆNA.**

**TRIBE V. Osmundææ.** *Capsules much larger than in the preceding sections, distinct, clustered on the back of the frond, forming irregular sori, without involucre, sessile or shortly stalked, 2-valved vertically, with a short, transversely striate, lateral or sub-terminal areola.*

- Frond opaque, coriaceous . . . . . 25. **TODEA.**  
 Frond translucent, membranous . . . . . 26. **LEPTOPTERIS.**

## II. Capsules in spikelets or panicles, or confluent into lobed or many-celled masses.

**TRIBE VI. Schizææææ.** *Capsules distichously arranged on spikelets, ovoid, sessile, attached by their sides, with radiating striae from their crown.*

- Spikelets projecting from the margins of fertile flabellate pinnae.  
 Stipes scandent . . . . . 27. **LYGODIUM.**  
 Spikelets distichous, pinnately arranged at the top of a simple stipes  
 or of the flattened branches of a flabellate frond . . . . . 28. **SCHIZÆA.**

**TRIBE VII.** *Capsules on the back of the pinnae, very coriaceous, connate into a 2-valved, oblong or linear lobed sorus, with no ring or reticulations.*

- Fronds very large, 2-pinnate . . . . . 29. **MARATTIA.**

**TRIBE VIII. Ophioglosseæ.** *Capsules globose, coriaceous, 2-valved, separate or confluent in a spike, or on the branches of a compound panicle, which is borne on a stipes and is apart from the frond.—Vernation not circinate.*

- Frond ovate, simple. Capsules on a simple terminal spike . . . 30. **OPHIOGLOSSUM.**  
 Frond pinnate or 2- or 3-pinnate. Capsules on a pinnate, or 2- or  
 3-pinnately-branched panicle . . . . . 31. **BOTRYCHIUM.**

1. **GLEICHENIA**, Smith.

Rhizome wiry, rigid, creeping.—Stipes erect, often tall and slender. Frond dichotomously branched, with a terminal bud at each fork; branches sometimes whorled, simple forked or pinnate. Pinnæ pinnatifid; segments flat or concave, sometimes so much so as to form an involucre. Sori of 1–6 sessile capsules, which burst longitudinally, and are girt by a complete oblique ring.

A considerable tropical and southern genus of Ferns, not found in Europe or temperate North America, and only in subtropical and tropical Asia.

1. *Sori on the tips of the veinlets. Ultimate lobules of pinnae small, short, broad.*

- Lobules of frond flat or incurved. Sori exposed . . . . . 1. *G. circinata.*  
 Lobules of frond pouch-like. Sori concealed in the pouches . . . 2. *G. dicarpa.*

2. *Sori on the middle or forks of the veinlets. Ultimate segments of pinnae linear.*

- Frond rigid, coriaceous; segments entire, glaucous below . . . 3. *G. Cunninghamii.*  
 Frond membranous; segments serrulate, not glaucous below . . . 4. *G. flabellata.*

1. **G. circinata**, Swartz.—*G. semivestita*, Labill.;—Fl. N. Z. ii. 5. Rhizome slender, chaffy. Fronds erect, very slender, 1–3 ft. high, dichotomously branched; stipes very slender, brown, more or less hairy scaly and chaffy or glabrous; branches very narrow, 6–12 in. long, forked and pinnate. Pinnæ  $1\frac{1}{2}$ –2 in. long,  $\frac{1}{16}$ – $\frac{1}{2}$  in. broad, uniformly pinnatifid to the base, the lobules semicircular flat or incurved, shining above, not pouch-shaped as in

the following, green or glaucous below, glabrous or covered below with long weak hairs; rachis and costa often chaffy when young, glabrate when old. Capsules 1-4.—Hook. Sp. Fil. i. 3, t. 2 A; *G. microphylla*, Br.

Var. *β. hecistophylla*. More chaffy; rachis often woolly; lobules of frond much incurved.—*G. hecistophylla*, A. Cunn.; Hook. Sp. Fil. i. 4, t. 2 B.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. **Chatham** Island, *Dieffenbach*. Equally abundant in Australia, Tasmania, New Caledonia, and some of the Malayan and Pacific Islands. Young specimens of this have been sent from New Zealand as *G. speluncea*, Br. Mrs. Jones observes that the natives affirm that this Fern is the first to appear after clearing the forest, and hence call it Matua Rarauhe (father of Ferns).

2. **G. dicarpa**, Br.;—*Fl. N. Z.* ii. 5. Rhizome slender, chaffy, and woolly. Fronds erect, of the same habit and character as *G. circinata*, but usually woolly, especially at the nodes, and the ultimate segments of the frond are more coriaceous and pouch-shaped, being very convex above, and presenting a small opening below, within which the capsules are seen.—Hook. Sp. Fil. i. 3, t. 1 C; Fil. Exot. t. 40.

Var. *β. alpina*. Smaller, 3-10 in. high, stouter in proportion, more densely woolly and chaffy.—*G. alpina*, Br.; Hook. Sp. Fil. i. 2.

**Northern** Island: var. *β*, Lake Taupo and mountainous districts of the interior, *Colenso*. **Middle** Island: var. *α* and *β*, probably common throughout to Foveaux Straits, *Lyall*.

3. **G. Cunninghamii**, *Heward*;—*Fl. N. Z.* ii. 6, t. 71. Rhizome stout, creeping. Fronds stout, erect, 1-2 ft. high, stiff, dichotomously and often proliferously branched. Stipes stout, pale, smooth, naked or covered with membranous bullate scales that extend to the rachis and costa; branches stout, curving, 6-18 in. long, flabellate, forked, usually woolly at the base, pinnate below, pinnatifid above, tips often caudate; pinnules  $\frac{1}{2}$ -1 in. broad, decurrent, linear, falcate, very coriaceous,  $\frac{1}{3}$ - $\frac{2}{3}$  in. long,  $\frac{1}{6}$ - $\frac{1}{4}$  broad, flat or with the margins recurved, quite entire, often glaucous and pilose below. Capsules 2-6, usually exposed.—Hook. Sp. Fil. i. 6, t. 6 B.

Common throughout the **Northern** Island, *Cunningham*, etc. **Middle** Island: Canterbury, *Travers*. **Stewart's** Island, *Lyall*.

4. **G. flabellata**, Br.;—*Fl. N. Z.* ii. 6. Habit of *G. Cunninghamii*, but taller, much more membranous, with often numerous tiers or whorls of erect or ascending branches; stipes, rachis, and branches without scales; pinnules glabrous or rarely pubescent below, serrulate towards the tip, green on both surfaces.—Hook. Sp. Fil. i. 6; Fil. Exot. t. 71.

**Northern** Island: in shady woods, Bay of Islands, *A. Cunningham*, etc. Also a native of New Caledonia, Australia, and Tasmania.

---

*G. Hermannii*, Br. (*Polypodium dichotomum*, Forst.), a common tropical plant, is erroneously introduced by Forster amongst his New Zealand plants, as a native of arid mountains. In his 'Esculent Plants' he states that the roots are roasted, pounded, and eaten by the natives; the plant does not exist in his or in any other New Zealand Herbarium.

## 2. CYATHEA, Smith.

Tree-ferus in New Zealand. Fronds very large, 2- or 3-pinnate. Sori



distant from the margin, globose, enclosed in a spherical involucre, which bursts irregularly, leaving a cup all round, or shallow cup on one side. Capsules crowded on a short club-shaped receptacle, half girt with an incomplete vertical striate ring.

A large temperate and tropical genus, unknown in the north temperate zone. I have availed myself largely of Mr. Ralph's notes (Journ. Linn. Soc. Bot. iii. 163), in the descriptions of the habit, etc., of the species.

- |   |                             |
|---|-----------------------------|
| Fronds white and glaucous below . . . . .   | 1. <i>C. dealbata</i> .     |
| Fronds not white nor glaucous below.  |                             |
| Fronde 10-20 ft., coriaceous, costa glabrous above, tubercled below ;<br>fertile pinnæ subpinnatifid . . . . .    | 2. <i>C. medullaris</i> .   |
| Fronde coriaceous ; rachis glabrous above, woolly below ; fertile<br>pinnæ entire, serrulate at the tip . . . . . | 3. <i>C. Milnei</i> .       |
| Fronde 6-9 ft., flaccid, membranous ; costa strigose above ; fertile<br>pinnæ subpinnatifid . . . . .             | 4. <i>C. Cunninghamii</i> . |
| Fronde 8-9 ft., coriaceous ; costa strigose above at the tips ; pinnæ<br>falcate, coarsely toothed . . . . .      | 5. <i>C. Smithii</i> .      |

1. ***C. dealbata***, Swartz ;—*Fl. N. Z.* ii. 7. Trunk slender, branched, almost black, sometimes 40 ft. high. Fronds 8-10 or more, broadly oblong-lanceolate, 8-12 ft. long, dark-green above, milk-white below, 2-pinnate ; stipes and rachis slender, pale, smooth, when young clothed with brown subulate scales ; primary divisions 1-1½ ft. long, rachis and midrib covered with pale deciduous down ; secondary linear-lanceolate, 2-4 in. long, acuminate or caudate, pinnate below, pinnatifid above ; pinnules close-set, linear-oblong, obtuse, serrate. Sori numerous, small, pale ; involucre membranous ; receptacle pubescent.—Hook. Sp. Fil. i. 27 ; A. Rich. Flor. t. 10.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. "Silver Tree-fern" of the settlers. Also found in Lord Howe's Island.

2. ***C. medullaris***, Swartz ;—*Fl. N. Z.* ii. 7. Trunk very stout, 12-40 ft. high, 4-8 in circumference, conical and densely covered with matted fibres below ; above marked with hexagonal scars of fallen fronds ; at the top rough with the projecting bases of the old fronds. Fronds very numerous, 30-40, 10-20 ft. long, erecto-patent, coriaceous, oblong-lanceolate, 3-pinnate, lanceolate-oblong, deep green above, pale below ; stipes and rachis stout, covered with scattered tubercles ; secondary divisions 4-6 in. long, sessile, linear, ¾-1¼ in. broad, acuminate, pinnate below, pinnatifid above, glabrous or covered with small ciliate or jagged scales ; pinnules linear, falcate, acute, ½ in. long, ¼-⅓ broad, lobulate or subpinnatifid (barren and young broader and quite entire), lowest pinnatifid. Sori numerous, one on each lobe of the pinnule, which is often recurved over it ; involucre cup-shaped, split from the base.—Hook. Sp. Fil. i. 27 ; *Polypodium medullare*, Forst.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. "Black Fern" of the settlers. This differs from the Norfolk Island and Pacific island allied species in the fertile pinnæ being always lobulate, or almost pinnatifid. The thick mucilaginous pith was once an article of food with the natives.

3. ***C. Milnei***, Hook. *ms.* Very similar to *C. medullaris*, but the rachis is not tubercled, is woolly below, and the fertile pinnæ are entire, ⅓ in. long, ⅓ broad, serrulate at the tip only.

**Kermadec** Islands, *Macgillivray*. This I took for *C. medullaris* in the account of Kermadec Island plants, published in the Linnæan Journal, Bot. i. 128. Trunk 20–30 ft. high, 9 in. diam.

4. **C. Cunninghamii**, *Hook. f. Fl. N. Z.* ii. 7. Trunk 12–20 ft. high, fibrous at the base and for 5 ft. up, covered with the persistent bases of the fronds. Fronds 20–30 in a crown, 6–9 ft. long, erecto-patent, flaccid, 3-pinnate, acuminate; stipes and rachis slightly warted, pale-coloured, pubescent and scaly as in *C. medullaris*; costa strigose above; rachis with linear, warty scars on each side; pinnules sessile, linear, pinnatifid,  $\frac{1}{2}$  in. long,  $\frac{1}{10}$ – $\frac{1}{12}$  broad; segments rounded, quite glabrous. Sori numerous; involucre variously torn, sometimes irregularly from the top, at others from the base on one side, turning over and forming a shallow cup, as in *C. Smithii*.—*Hook. Ic. Pl.* t. 985.

**Northern** Island: Bay of Islands, *Cunningham*, etc.; east coast and interior, *Colenso*; Auckland, *Sinclair*; Port Nicholson, in dense forests, *Ralphs*. Very similar to *C. medullaris*, and perhaps only a variety of it, but a much more delicate and flaccid plant, with smaller pinnules and sori, and the rachis above usually covered with long brown hairs.

5. **C. Smithii**, *Hook. f. Fl. N. Z.* i. 8. t. 72. Trunk 20 ft. high, covered with the ragged naked stipites of the old fronds, densely fibrous at the base. Fronds 8–9 ft. long, lanceolate, not acuminate, 2-pinnate, bright pale green; stipes stout, dark-coloured, covered at the base with stiff, subulate, dark-brown scales 1–1 $\frac{1}{2}$  in. long; rachis pale-coloured, quite glabrous and smooth, except toward the ends of the segments, where these and the costa are strigose above; primary divisions 12–15 in. long, 4–5 broad, glabrous above except the rachis and costa, pale beneath, secondary 2–2 $\frac{1}{2}$  in. long, pinnate below, pinnatifid above; pinnules linear-oblong, acute, falcate, coarsely toothed. Sori on the forks of the veins; involucre bursting from the base on one side, turning over and forming a shallow cup.

**Northern** Island: mountainous districts in the east coast and interior, *Colenso*; Wellington, *Sinclair*, *Ralphs*, usually near streams. **Middle** Island: apparently common throughout. The most common species at Otago; trunk hard, close-grained, heavy, *Buchanan*. Mr. *Ralphs* observes that the young involucre never covers the sorus, and that this is hence a true *Hemitelia*, from which, however, it differs in habit and the narrow pinnules.

### 3. *ALSOPHILA*, Br.

Generally Tree-ferns.—Fronds very large, 2- or 3-pinnate. Sori distant from the margin, differing from those of *Cyathea* only in the absence of an involucre.

A large tropical genus, extending into Australia, Tasmania, and New Zealand; distinguished from *Polypodium* by its usually arboreous habit and tumid receptacle.

1. **A. Colensoi**, *Hook. f. Fl. N. Z.* ii. 8. t. 73. Trunk 4–5 ft. high (according to *Colenso* sometimes absent); young parts covered with lax fulvous or red-brown hairs, and tumid, fimbriate, membranous scales, covering a minute stellate pubescence. Fronds 2–4 ft. long, 2-pinnate; stipes clothed at the base with long subulate white scales  $\frac{1}{2}$ – $\frac{3}{4}$  in. long; rachis weak; primary divisions 1 ft. long, 4 in. broad, lanceolate, acuminate; pinnules 1 $\frac{1}{2}$ –2 in. long, acuminate, deeply cut into oblong, obtuse, and obtusely-toothed lobules. Sori numerous, prominent, on the middle of the veins.

**Northern** Island: Roahine range, *Colenso*. **Middle** Island: probably common Southern Alps, *Haast*; Otago, alt. 2000 ft., *Sinclair*, *Hector*, and *Buchanan*.

#### 4. **DICKSONIA**, L'Héritier.

Trunk often arboreous.—Fronds large, 2- or 3-pinnate. Sori on the margin, globose, enclosed in a 2-valved involucre; inner valve of involucre coriaceous, placed on the end of a vein; outer formed of the recurved concave tooth of the pinnule. Capsules on an elevated receptacle, half girt with an incomplete vertical striate ring.

A large genus of Ferns, most abundant in humid south temperate climates.

Trunk black. Stipes tubercled, black. Sori numerous on each segment 1. *D. squarrosa*.  
Trunk brown. Stipes smooth, pale, woolly at the base. Sori 4 or 5 on each segment . . . . . 2. *D. antarctica*.  
Trunk short or 0. Stipes smooth, woolly at the base. Sori 6-10 on each segment . . . . . 3. *D. lanata*.

1. **D. squarrosa**, *Swartz*;—*Fl. N. Z.* ii. 9. Trunk 10-20 ft. high, slender, quite black, covered with the persistent bases of the fronds. Fronds few, 6-10 ft. long, young clothed with soft brown wool, rigidly coriaceous, 2- or 3-pinnate; stipes stout, black, tubercled, covered with deciduous hairs and chaff; primary divisions 10-30 in. long, 4-6 broad, with long points; secondary often stipitate, 3-4 in. long,  $\frac{1}{2}$ - $\frac{3}{4}$  broad, linear, acuminate, fertile narrower; pinnules oblong, rigid,  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, pungent, deeply toothed. Sori numerous, large.—*Hook. Sp. Fil.* i. 68; *Trichomanes squarrosus*, *Forst.*

Abundant throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc.

2. **D. antarctica**, *Br.*;—*Fl. N. Z.* ii. 10. Trunk 10-20 ft. high, stout, 1-2 ft. diam., covered with matted yellow-brown rootlets. Fronds few or numerous, 6-10 ft. long, lanceolate, 2-pinnate, coriaceous: stipes smooth, glabrous, pale-brown; rachis and midribs clothed with spreading deciduous hairs; primary divisions 10 in. long,  $1\frac{1}{2}$  broad, narrowed into long tips; pinnules sessile,  $\frac{3}{4}$ -1 in. long, linear or narrow-oblong, acute, fertile pinnatifid, barren lobulate; segments oblong, acutely toothed. Sori about 4 on each segment.—*Labill. Fl. Nov. Holl.* t. 249; *Hook. Sp. Fil.* i. 66; *D. fibrosa*, *Col.* in *Tasm. Journ.*; *Hook. Sp. Fil.* i. 68. t. 23 B.

**Northern** Island: Wairarapa valley, Te Waiite and Mohaka, *Colenso*. **Middle** Island: Canterbury and Nelson, *Travers*; Otago, *Hector* and *Buchanan*. A most abundant Fern in Tasmania and South Australia, attaining there 40 ft. in height, and 4 in diam. Trunk used in building houses, *Colenso*, *Buchanan*.

3. **D. lanata**, *Col.* in *Tasm. Journ.*;—*Fl. N. Z.* ii. 10. Trunk usually stout or absent, rarely 4 ft. high. Fronds 1-7 ft. long, very coriaceous, broad lanceolate or ovate, 2- or 3-pinnate; stipes smooth, towards the base clothed with long soft yellowish or purplish silky hairs  $\frac{3}{4}$  in. long, upper part and rachis glabrous; primary divisions 5-14 in. long, oblong-lanceolate, acuminate; pinnules sessile,  $1\frac{1}{2}$ - $3\frac{1}{2}$  in. long, linear, acuminate, fertile contracted again pinnate, barren lobulate or pinnatifid; segments short, oblong, obtuse or pungent. Sori about 4 on each segment, covering the whole under surface of the frond.—*Hook. Sp. Fil.* 69. t. 23 C.

**Northern** Island: Bay of Islands, east coast, and interior, abundant in many places, *Cunningham*, etc. **Middle** Island: Massacre Bay, *Travers*.

## 5. HYMENOPHYLLUM, Smith.

Rhizome very slender, wiry, creeping.—Fronds usually matted, small ( $\frac{1}{2}$ –10 in. long), pinnate or 2- or 3-pinnatifid, pale-green, pellucid, beautifully reticulated when magnified; segments with 1 stout, never branched midrib. Sori axillary or terminal, free or sunk in the segments, globose or oblong, enclosed in a 2-valved membranous involucre, whose lips open outwards. Capsules sessile on a stalked or filiform receptacle, depressed, girt by a complete horizontal striate ring.

A very large tropical and temperate genus, of most beautiful small Ferns. A few South American species have simple fronds. The species inhabit forests, often clothing stumps and trunks of trees.

## I. Fronds glabrous; margins toothed or serrate.

*Receptacle not exerted.*

- |  |                             |
|--|-----------------------------|
| Frond pinnate, pinnæ pinnatifid. Invol. smooth, supra-axillary, valves jagged or toothed . . . . .     | 1. <i>H. tunbridgense</i> . |
| Frond pinnate, pinnæ pinnatifid. Invol. free, smooth, supra-axillary, valves quite entire . . . . .    | 2. <i>H. unilaterale</i> .  |
| Frond minute, pinnatifid. Invol. terminal, free, with toothed backs and lips . . . . .                 | 3. <i>H. minimum</i> .      |
| Frond 2- or 3-pinnatifid. Invol. terminal, base sunk in the frond, smooth; lips quite entire . . . . . | 4. <i>H. bivalve</i> .      |
| <i>Receptacle exerted.</i> Involucre free . . . . .  | 5. <i>H. multifidum</i> .   |

## II. Fronds glabrous, or setose only on the stipes, rachis and costa; margins neither toothed nor ciliate.

*Fronds pinnatifid, rarely pinnate below; rachis and generally the stipes also winged.*

- |  |                             |
|--|-----------------------------|
| Rhizome and stipes capillary. Frond pendulous, flat, membranous. Invol. broad, flat, terminal, sunk in the frond . . . . . | 6. <i>H. rarum</i> .        |
| Rhizome stout, bristly. Frond tall, broad. Invol. orbicular, free, terminal . . . . .                                      | 7. <i>H. pulcherrimum</i> . |
| Rhizome stout, glabrous. Frond tall, 3-pinnatifid. Invol. orbicular, terminal, half sunk . . . . .                         | 8. <i>H. dilatatum</i> .    |
| Frond 3-pinnatifid; segments and wing of rachis crisped or waved. Invol. ovate, free, terminal . . . . .                   | 9. <i>H. crispatum</i> .    |
| Frond 3-pinnatifid; segments narrow, concave. Invol. ovate, free, axillary . . . . .                                       | 10. <i>H. polyanthos</i> .  |

*Frond pinnate below. Stipes not winged. Rachis winged above only.*

- |  |                             |
|--|-----------------------------|
| Stipes and rachis glabrous. Frond bright-green. Invol. small, ovate . . . . .                      | 11. <i>H. demissum</i> .    |
| Stipes and rachis bristly. Frond dark-green. Invol. orbicular . . . . .                            | 12. <i>H. scabrum</i> .     |
| Stipes woolly at the base only and stipes glabrous. Frond pale, glistening. Invol. small . . . . . | 13. <i>H. flabellatum</i> . |

## III. Costa, margins and sometimes both surfaces of the fronds covered with stellate hairs.

- |  |                            |
|--|----------------------------|
| Frond pendulous, opaque, clothed with red-brown stellate hairs . . . . .                   | 14. <i>H. æruginosum</i> . |
| Frond pendulous, membranous, transparent; margins and costa with stellate hairs . . . . .  | 15. <i>H. Lyallii</i> .    |
| Frond rigid, erect, clothed with stellate hairs. See <i>Trichomanes Malingii</i> , p. 356. |                            |

1. *H. tunbridgense*, Smith;—*Fl. N. Z.* ii. 11. Small tufted or matted, quite glabrous. Rhizome slender, wiry. Frond 1–3 in. high, ovate or linear, pinnate below, pinnatifid above; segments close or distant, long or short, spreading or decurved, toothed. Involucres supra-axillary, orbicular, compressed, their base sunk in the segments (free in var.  $\beta$ ), lips spinulose or toothed.—Hook. Sp. Fil. i. 95.



Var. *β. cupressiforme*. Frond longer, narrower, more rigid, erect; segments remote, decurved, very narrow. Involucres free.—*H. cupressiforme*, Labill. Fl. Nov. Holl. t. 250. f. 2; *H. revolutum*, Col.

Throughout the **Northern** and **Middle** Islands, abundant, on rocks and trees. **Lord Auckland's** group, *J. D. H.* A very common Fern in most humid parts of the globe, and found in England.

2. **H. unilaterale**, *Willdenow*;—*Fl. N. Z.* ii. 11. So closely allied to *H. tunbridgense*, that the entire lips of the involuere often alone distinguish it; but usually a narrow plant with denser cellular tissue, more like var. *β. cupressiforme* in habit and colour.—*H. Wilsoni*, Hook. Sp. Fil. i. 95; *H. novo-Zelandicum*, Van den Bosch (a small form).

**Northern** Island: Ruahine range, etc., *Colenso*. **Middle** Island: common, Southern Alps, *Haast*; Otago, *Hector and Buchanan*. Also found in England and various other parts of the world, often with *H. tunbridgense*, its real or supposed differences from which have given rise to endless discussions.

3. **H. minimum**, *A. Rich.*, *Fl. t.* 14;—*Fl. N. Z.* ii. 12. Small, matted, quite glabrous. Frond 1–2 in. high, broadly ovate, falcate or recurved, pinnatifid, pinnate below; segments entire or cut into 2 or 3 linear, obtuse, ciliate-toothed, concave, rigid lobes. Involucres terminal, free, stipitate, obovate-cuneate; valves spinulose at the back; lips short, toothed.

**Northern** Island: on roots and stumps of trees, *D'Urville*, etc. **Middle** Island: Otago, *Hector and Buchanan*. **Lord Auckland's** group, *J. D. H.*, *Bolton*.

4. **H. bivalve**, *Swartz*;—*Fl. N. Z.* ii. 12. Matted, quite glabrous. Rhizomes stout, wiry, creeping. Fronds 2–8 in. high, rather rigid, broadly ovate, 2- or 3-pinnatifid, often decurved, dark-green; segments narrow, often decurved, deeply toothed. Involucres terminal, broadly ovate, turgid, base sunk in the frond, 2-fid to the middle, smooth; lips quite entire; receptacle included.—Hook. Sp. Fil. i. 98. t. 35; *H. spatulatum*, Col. in Tasm. Journ.; *Trichomanes bivalve*, Forst.; *T. pacificum*, Hedw.

**Northern** Island: east coast and hilly regions of the interior, *D'Urville*, *Colenso*, etc. **Middle** Island: abundant, *Forster*, etc.

5. **H. multifidum**, *Swartz*;—*Fl. N. Z.* ii. 12. Very similar in size, habit, and colour to *H. bivalve*, but usually more sharply toothed, rachis hardly winged above. Involucres axillary, often decurved or pendulous, quite free, large, urceolate or obovate, with the receptacle exserted.—Hook. Sp. Fil. i. 98; *Trichomanes multifidum*, Forst.

Throughout the islands, abundant, *Banks and Solander*, etc. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.*, *Bolton*.

6. **H. rarum**, *Br.*;—*Fl. N. Z.* i. 12. A very delicate, membranous, matted, pendulous fern, glistening and pale-green, quite glabrous, margins entire. Frond oblong or linear-oblong, 1–8 in. long, flat, flaccid, pinnatifid, pinnate at the base; stipes and rachis capillary; segments short, broad, flat. Involucres large, broad, compressed, ovate or rhomboid, sunk in the ends of the segments; lips very short, broad, quite entire.—Hook. Sp. Fil. i. 101; *H. semi-bivalve*, Hook. and Grev.; *H. fumarioides*, Bory; *H. imbricatum*, Col.

Abundant throughout the **Northern** and **Middle** Islands, clothing the trunks of tree-ferns. **Lord Auckland's** group, *J. D. H.*, *Bolton*. Also common in Tasmania, Chili, South Africa, and some parts of India.

7. **H. pulcherrimum**, Col.;—*Fl. N. Z.* ii. 13. t. 74. Tall, stout, bright green, very handsome. Rhizome short, stout, clothed with stiff bristles. Frond glabrous, 12–18 in. high, ovate or linear-oblong, 2- or 3-pinnatifid; stipes winged to the base; segments linear, obtuse, membranous; ultimate alternate, margins entire. Involucres small, axillary or terminal, free, 2-lobed to the base; lips entire.—Hook. Sp. Fil. i. 103. t. 37.

**Northern** Island: mountains of the east coast and interior, *Colenso*. **Middle** Island: abundant, often pendulous from trees, *Lyall*, etc.

8. **H. dilatatum**, Swartz;—*Fl. N. Z.* ii. 13. Large, tall, handsome, bright-green. Rhizome long, stout, wiry, glabrous. Fronds 6–18 in. high, erect or decurved, broadly ovate or oblong-ovate, quite glabrous, 3-pinnatifid, stipes winged to the base; segments ovate or lanceolate, often cuneate at the base; ultimate linear, often elongate, obtuse, margins quite entire. Involucres orbicular, terminal, sunk in the tips of the segments, deeply 2-fid; lips entire.—Hook. Sp. Fil. i. 104; *Trichomanes dilatatum*, Forst.; *Leptocodium sororium*, Presl.

Abundant throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. **Lord Auckland's** group, *J. D. H.* Also found in Java and the Fiji Islands.

9. **H. crispatum**, Wallich;—*Fl. N. Z.* ii. 13. Tufted or matted, dull green, crisped. Rhizome glabrous, wiry, creeping. Fronds erect or decurved, glabrous, rather rigid, 2–3 in. high, 2- or 3-pinnatifid; rachis with a broad crisped wing; pinnæ cut into narrow linear, quite entire, crisped or waved, rarely flat lobes  $\frac{1}{10}$  in. broad. Involucres usually numerous, terminal, free, ovate, turgid, broader than the segments, 2-valved to the base; lips entire or jagged.—Hook. Sp. Fil. i. 105; *H. flabellatum*, Br. not Labill.; *H. flexuosum*, A. Cunn.; *H. atro-virens*, Col.

**Northern** Island: in woods, Bay of Islands, etc., but not common, *Logan*, *A. Cunningham*, etc. **Middle** Island: Canterbury, *Travers*; Otago, *Hector* and *Buchanan*. An abundant Tasmanian and Indian fern.

10. **H. polyanthos**, Swartz.—Var.  $\beta$ . *sanguinolentum*, Hook. Sp. Fil. i. 106; *Fl. N. Z.* ii. 14. Matted, 2–6 in. high. Rhizome rather stout. Frond rather rigid, opaque, reddish, erect or decurved, broad ovate or oblong, 2- or 3-pinnatifid; stipes narrowly winged, glabrous or bristly; rachis broadly winged; segments spreading or decurved, narrow linear, flat or waved; ultimate short, quite entire; midribs flexuous, stout, dark. Involucres numerous, axillary and terminal, free, orbicular or ovate, broader than the segments, 2-valved to the base; lips obtuse, entire or jagged.—*H. sanguinolentum*, Swartz; *H. villosum*, Col.

Abundant throughout the **Northern** and **Middle** islands, *Banks* and *Solander*, etc. This fern has often strong peculiar odour when dry.

11. **H. demissum**, Swartz;—*Fl. N. Z.* ii. 14. Matted, forming large bright-green tufts. Rhizome glabrous, wiry. Frond membranous, 4–10 in. high, 3–4 broad, decurved deltoid or ovate-lanceolate, pinnate below, pinnatifid above; stipes rigid, glabrous, not winged; rachis winged above only; segments ascending, 2- or 3-pinnatifid; lobes narrow,  $\frac{1}{20}$  in. broad, often elongate, quite entire. Involucres on the lateral segments, terminal, small, ovate, convex, 2-valved to the base; lips quite entire.—*Trichomanes*, Forst.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. **Kermadec** Islands, *Macgillivray*. **Lord Auckland's** group, *J. D. H.*

12. **H. scabrum**, *A. Rich. Fl. t. 14. f. 1*;—*Fl. N. Z. ii. 15*. Rhizome stout. Frond rigid, 6–24 in. high, bright but dark-green, stout, erect or curved, elongate ovate or deltoid; stipes stout, not winged, covered with stout bristles, as are the rachis and often midribs; rachis winged above only; segments and involucres as in *H. dilatatum*, but the involucres are broader, with generally toothed lips.—Hook. Sp. Fil. i. 110; *Sphærocionium glanduliferum*, Presl.

**Northern** Island, *D'Urville*; Bay of Islands, *A. Cunningham*; east coast, *Colenso*. **Middle** Island: Nelson and Canterbury, *Travers, Haast*; Otago, *Hector and Buchanan*.

13. **H. flabellatum**, *Labill. Fl. Nov. Holl. t. 250. f. 1, not Brown*;—*Fl. N. Z. ii. 15*. Matted, densely clothing trunks of trees, with pale-green glistening fronds. Rhizome rigid. Fronds imbricate, erect or decurved, broadly ovate, or linear elongate, 2–6 in. long, pinnate below, pinnatifid above; stipes rigid, not winged, woolly at the base, glabrous above; segments 2-pinnatifid, flabellate, broadly cuneate at the base, glabrous; lobes linear, quite entire. Involucres small, terminal on lateral segments, orbicular or oblong; lips entire or toothed.—Hook. Sp. Fil. i. 111; *H. nitens*, Br.; *H. Hookeri*, Van den Bosch.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. **Lord Auckland's** group, *Bolton*. Also found in the Philippine Islands.

14. **H. æruginosum**, *Carmichael*;—*Fl. N. Z. ii. 15*. Rhizome filiform. Fronds pendulous, ovate or long and linear, 3–10 in. long; pinnate below, pinnatifid above, red-brown when dry from the copious stellate hairs; stipes filiform, not winged; segments short, linear or ovate, 2-pinnatifid, quite entire; lobes linear, approximate. Involucres terminal, orbicular or broader than long, sunk in the frond; lips short, pilose.—Hook. Sp. Fil. i. 94. t. 34; *H. Franklinianum*, Col.

**Northern** Island: Waikare lake, *Colenso*; Wellington (*Mrs. Jones*). **Middle** Island: abundant in subalpine forests, as far south as Dusky Bay, *Menzies*, etc. Also a native of Juan Fernandez, Chiloe, and Tristan d'Acunha.

15. **H. Lyallii**, *Hook. f., Fl. N. Z. ii. 16*. A small, pendulous species, like *H. rarum*. Rhizome capillary. Frond  $\frac{1}{2}$ –2 in. long, orbicular or oblong, excessively membranous, pinnatifidly or digitately divided into linear segments, which are quite entire, obtuse, with stellate hairs on the margins and midrib. Involucres cuneate triangular or obcordate, sunk in the frond; lips concave, quite entire, retuse.

**Middle** Island: Thomson's Sound, on trees, *Lyall*; Otago, common in the sounds of the west coast, on overhanging rocks, etc., *Hector and Buchanan*.

## 6. TRICHOMANES, Smith.

Rhizome tufted or creeping, stout or slender.—Fronds erect or pendulous, usually small simple pinnate or 2- or 3-pinnatifid, pale or dark green, usually pellucid, beautifully reticulated when magnified; segments with one stout simple or branched midrib. Sori axillary or terminal, enclosed in a campanulate or tubular, elongate, 2-lipped, free or sunk involucre, opening outwards.

Capsules sessile on a filiform, elongate, often exserted receptacle, depressed, girt by a complete horizontal striate ring.

A large tropical genus of ferns, of which one species is found in various damp insular and mountain regions of the north temperate zone, and several in the south temperate.

Fronde glabrous, erect, simple, reniform . . . . . 1. *T. reniforme*.

Fronde glabrous, erect, lurid-green, much divided.

Fronde lanceolate, pale-green, membranous . . . . . 2. *T. strictum*.

Fronde ovate or deltoid, dark green, rigid . . . . . 3. *T. elongatum*.

Fronde glabrous, pendulous, very delicate, membranous, divided.

Margin of frond thickened. Midrib simple . . . . . 4. *T. humile*.

Margin of frond not thickened. Midrib simple . . . . . 5. *T. Colensoi*.

Margin of frond not thickened. Midrib branching . . . . . 6. *T. venosum*.

Fronde densely clothed with stellate down . . . . . 7. *T. Malingii*.

1. ***T. reniforme*, Forst.**;—*Fl. N. Z.* ii. 16. Rhizome rigid, stout, creeping. Fronds remote, rigid, erect, 4–8 in. high, dark green, transparent when fresh, brown and horny when dry, reniform with a deep sinus, 2–4 in. broad, slightly decurrent on the stout glabrous stipes; veins repeatedly forked, rarely reticulated. Involucres numerous, often crowded along the edge of the frond, tubular or urceolate; receptacles club-shaped, exserted.—Hook. Sp. Fil. i. 115; Fil. Exot. t. 2.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. One of the most beautiful and singular ferns, confined to these islands.

2. ***T. strictum*, Menzies**;—*Fl. N. Z.* i. 17. Rhizome very short, stout, sending out many rigid roots, with many fronds tufted at its top. Fronds crowded, rigid, erect, dark green, 4–10 in. high, linear-oblong or lanceolate, pinnate; stipes stout, black, terete, slightly winged, with red-brown shining bristles at the base; pinnae lanceolate, ascending or recurved, 2- or 3-pinnatifid or irregularly cut; segments very narrow, obtuse or retuse; midrib stout, unbranched. Involucres erect, free, pedicelled; receptacle included or exserted.—Hook. Sp. Fil. i. 136; *T. leptophyllum*, A. Cunn.; *T. Cunninghamii*, Van den Bosch.

**Northern** Island: Hokianga, *A. Cunningham*. **Middle** Island: Dusky Bay, *Menzies, Hector and Buchanan*; Massacre Bay, *Lyall, Travers*. Probably the same as a Fiji Island species.

3. ***T. elongatum*, A. Cunn.**;—*Fl. N. Z.* ii. 17. Rhizome short, horizontal, woody, with strong root-fibres and crowded ascending fronds. Fronds 4–10 in. high, rigid, erect, ovate or deltoid, 2-pinnate, lurid green, often covered with mosses, etc.; stipes rigid, stout, terete, not winged, slightly hairy at the base; pinnae imbricate, crowded, oblong-cuneate, inciso-pinnatifid; segments broad, acute or notched at the tip; midrib stout, not branched. Involucres very numerous, supra-axillary, crowded, cylindric; lips short; receptacles long, rigid, exserted.—Hook. Ic. Pl. t. 701; Sp. Fil. i. 134.

Abundant in deep shaded woods throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc.

4. ***T. humile*, Forst.**;—*Fl. N. Z.* ii. 16. Rhizome capillary, creeping. Fronds pendulous, very pale, membranous, transparent, 1–4 in. long, linear-oblong, 1- or 2-pinnatifid; stipes slender, winged above; pinnae ascending, pinnatifid or forked, quite entire, obtuse, glabrous, margin thickened; midrib



stout, unbranched. Involucres sunk in short lateral segments, urceolate, shortly 2-lipped; receptacle included or very long exserted, capillary.—Hook. Sp. Fil. i. 123; *T. Endlicherianum*, Presl; *T. aureum*, Van den Bosch.

Abundant throughout the **Northern** and **Middle** Islands, on trunks of trees, etc., *Banks and Solander*, etc. Also found in the Pacific and West Indian and Philippine Islands.

5. **T. Colensoi**, Hook. f. in  *Ic. Plant. t. 979*;—*Fl. N. Z.* ii. 17. Rhizome capillary, creeping, hairy. Fronds pendulous, quite glabrous, linear-oblong, 1–3 in. long, 1- or 2-pinnate, dark green, very membranous; stipes and rachis filiform, glabrous; pinnae 5–10 pairs, distant, shortly stipitate, pinnate below, pinnatifid above; segments linear, quite entire,  $\frac{1}{16}$  in. broad, acute; margin not thickened; midrib stout, not branched. Involucres solitary at the base of the segments, free, erect, pedicelled, cylindric; mouth scarcely dilated; receptacle generally capillary, exserted.

**Northern** Island: dense forests, Waikare lake, *Colenso*. **Middle** Island: Nelson, *Travers*; Lake Wanaka, *Haast*.

6. **T. venosum**, Br.;—*Fl. N. Z.* ii. 17. Rhizome capillary, creeping, glabrous. Fronds pendulous, quite glabrous, very membranous, shining, transparent, linear, 2–5 in. long, pinnate. Stipes capillary, winged above; pinnae remote, broadly linear-oblong, cuneate at the base; segments  $\frac{1}{8}$  in. broad, obtuse or notched; margin waved, not thickened; midrib flexuose, giving off veins alternately. Involucres at the upper edge of the base of the pinnules, sunk in the frond or free, tubular or urceolate; mouth dilated, shortly 2-lipped; receptacle often capillary and exserted.

Abundant throughout the **Northern** and **Middle** Islands: clothing trunks of trees, etc., *Banks and Solander*, etc. Also common in Tasmania and South-east Australia.

7. **T. Malingii**, Hook. *Garden Ferns*, t. 64. Rhizome slender, filiform. Frond 4–8 in. high, erect, rigid, narrow linear-oblong, 2–4-pinnate, red-brown beneath, everywhere covered with pale-brown stellate pubescence; stipes not winged; divisions all very narrow-linear, coriaceous, almost terete, obtuse,  $\frac{1}{12}$  in. diam., quite entire. Involucres subglobose, terminating the segments, than which they are a little broader, rather turgid, concealed by the stellate pubescence; lips irregularly waved or crenate; receptacle included.

**Northern** Island: Mount Egmont (*Mrs. Jones*), **Middle** Island: mountains between Blind Bay and Massacre or Golden Bay, *Maling, Brunner*; Otago, Mount Cargill, near Dunedin, alt. 2000 ft., *Hector and Buchanan*. A very singular fern; I follow Sir W. Hooker in placing it in *Trichomanes*, though to me it appears most nearly related to *Hymenophyllum æruginosum*. For the fact of the Mount Egmont habitat I am indebted to a letter from Mrs. Jones, who however does not state the finder's name.

The supposed *Trichomanes*, from Manakau Bay, alluded to at vol. ii. p. 18 of the 'New Zealand Flora,' proves to be seedling fronds of *Polypodium tenellum*.

## 7. LOXSOMA, Br.

Rhizome stout, woody.—Fronds erect, coriaceous, pinnate, opaque. Sori marginal, enclosed in an urceolate coriaceous involucre, with a truncate mouth. Capsules shortly pedicelled, club-shaped, crowded on a long columnar exserted receptacle, mixed with jointed hairs, obliquely girt by an incomplete striate ring, bursting longitudinally.

1. **L. Cunninghamii**, *Br.*;—*Fl. N. Z.* ii. 18. Rhizome covered with long, curved, matted, red-brown hairs. Frond broadly triangular, 1–2 ft. high, bright green above, usually glaucous below, 3-pinnate; stipes and rachis glabrous, polished, channelled, pale brown; pinnæ ascending, lower opposite; secondary lanceolate, again pinnate or pinnatifid; segments linear-oblong, subacute, notched. Involucres in the notches of the segments, pointing backwards from the frond.—Hook. *Sp. Fil.* i. 86; *Gen. Fil.* t. 15; *Garden Ferns*, t. 51.

**Northern Island**: in woods, rare; Bay of Islands, at the falls of the Keri-Keri river, *Cunningham*; Wangarei river, *Sinclair*; Waitemata, *Mrs. Jones* (fronds never glaucous below); Coromandel, *Mrs. Jones* (fronds always white below). The only species of the genus, not found elsewhere.

### 8. CYSTOPTERIS, Bernhardt.

Delicate, flaccid ferns. Rhizome short, creeping.—Fronds tufted, pinnate or 2-pinnate. Veins pinnate and forked; veinlets free. Sori small, globose, on the back of the pinnules, inserted on the middle of a venule, distant from the margin. Involucre very membranous, attached by a broad base to the veinlet below the sorus, ovate or oblong, very convex, acute; margin jagged, at length reflexed. Capsules pedicelled, with a dorsal striate ring.

A small genus of ferns, natives of mountainous, cool, damp regions in the northern and southern hemispheres.

1. **C. fragilis**, *Bernhardt*. Fronds 3–6 in. high, lanceolate or oblong-lanceolate, pale green, pinnate or 2-pinnate; stipes slender, brittle, glabrous; rachis winged above, primary pinnæ rather remote, oblong or lanceolate, simple or again pinnate; pinnules incised and lobed, upper decurrent.—Hook. *Sp. Fil.* i. 198; *Fl. Tasman.* ii. 136. t. 166.

**Northern Island**: Mount Egmont, ranges (*Mrs. Jones*). **Middle Island**: Wairau and Kaikora mountains, alt., 3600 ft., *Travers*, *Sinclair*; Southern Alps, alt. 3000 ft., *Haast*; Otago, lake districts, *Hector* and *Buchanan*.

### 9. DAVALLIA, Smith.

Rhizome creeping in the New Zealand species, tufted in many others.—Frond compound, rarely simple. Veins pinnate, simple or dichotomous. Sori oblong or rounded, on or near the margin. Involucre coriaceous, superficial, arising from the tip of a vein, its base and usually its sides too, adnate to the surface of the frond, opening outwards. Capsules pedicelled, with a dorsal striate ring.

A large tropical and subtropical genus, of often very handsome ferns.

1. **D. novæ-Zelandiæ**, *Col.*;—*Fl. N. Z.* ii. 19. Rhizome creeping, woody, hispid. Frond 3–24 in. high, 3-pinnate, ovate or oblong, acuminate; stipes red-brown, polished, glabrous above, hispid below; rachis glabrous, polished, sometimes hairy in the axils; pinnæ stipitate, linear-oblong, acuminate; secondary ones oblong-lanceolate, with pinnatifid incised tips; ultimate stipitate,  $\frac{1}{2}$  in. long, sharply cut. Involucre orbicular or broadly ovate, jagged, attached by a broad base.—Hook. *Sp. Fil.* i. 158. t. 152; *Garden Ferns*, t. 51; *Acrophorus hispidus*, Moore?

**Northern** Island: Bay of Islands, *Cunningham*; east coast and interior, *Colenso*; Wellington, *Stephenson*, *Jolliffe*; Port Nicholson, *Lyall*. **Middle** Island: Otago, common, *Hector* and *Buchanan*.

*D. Lindleyi*, Hook., alluded to at vol. ii. p. 18, of the 'New Zealand Flora,' proves to be a Fiji Island plant, erroneously supposed to have been sent from New Zealand.

## 10. LINDSÆA, Dryander.

Rhizome tufted or creeping.—Frond usually compound, coriaceous. Veins free or anastomosing. Sori linear, parallel with and close to the margin, continuous or interrupted. Involucre of two valves, opening outwards, the upper being the margin of the frond, the lower membranous and rising from the tips of the veins.

A large tropical and subtropical genus.

Frond linear, pinnate . . . . . 1. *L. linearis*.  
Frond lanceolate, 1-3-pinnate . . . . . 2. *L. trichomanoides*.

1. ***L. linearis***, Swartz;—*Fl. N. Z.* ii. 19. Rhizome stout, creeping, scaly. Fronds distant, erect, 2-18 in. high, linear, pinnate, coriaceous, bright green; stipes and rachis stout, glabrous, purplish; pinnæ distant,  $\frac{1}{4}$  in. broad, cuneate or fan-shaped; margins entire or crenate, revolute when dry. Sori nearly continuous.—Hook. Sp. Fil. i. 206.

Common in rocky and stony places throughout the **Northern** and **Middle** Islands. Also abundant in temperate Australia and Tasmania.

2. ***L. trichomanoides***, Dryander;—*Fl. N. Z.* ii. 19. Rhizome creeping, chaffy. Fronds tufted, erect, 2-4 in. high, ovate or linear-oblong, pinnate or 2- or 3-pinnate; stipes and rachis stiff, 3-gonous, polished, the former scaly at the base; pinnæ distant, rarely simple, oblong-lanceolate, usually pinnatifid or again pinnate; segments or ultimate pinnæ  $\frac{1}{4}$ - $\frac{3}{4}$  in. long, cuneate, rounded in fruit, with a deep continuous intramarginal sorus.

Var. *a*. Frond 2- or 3-pinnate.—*L. trichomanoides*, Dryander,—Hook. Sp. Fil. i. 218; *L. viridis*, Col.; *Adiantum cuneatum*, Forst.

Var. *β*. *Lessoni*. Frond pinnate or 2-pinnate below; pinnæ oblong-lanceolate, obtuse, entire lobed or pinnatifid.—*L. Lessoni*, Bory, in Duperrey, Voy. 287. t. 37. f. 2.

Abundant throughout the **Northern** and **Middle** Islands: in woods. Also found in Tasmania.

## 11. ADIANTUM, Linn.

Rhizome creeping.—Fronds usually tufted and very compound, with the pinnæ on slender stalks, membranous or coriaceous. Veins simple forked or netted. Sori marginal, rounded or oblong and parallel to the margin. Involucre of the reflexed, often kidney-shaped, white or dark margins of the frond, opening inwards, its surface veined, the veins continuous with those of the pinnæ.

A very large tropical and temperate genus of ferns, known as "Maidenhair."

*Sori situated in the deep notches or crenatures of the pinnules.*

Frond pedate. Rachis hispid. Pinnules coriaceous, striate, hispid. 1. *A. hispidulum*.

Rachis glabrous, polished. Pinnules membranous, sparingly setulose above . . . . . 2. *A. affine*.

Rachis slender, glabrous, polished. Pinnules membranous, glabrous, orbicular . . . . . 3. *A. æthiopicum*.

*Sori situated on the lobules or teeth of the pinnules.*

Rachis pubescent above. Pinnules rigid, glabrous . . . . . 4. *A. formosum*.  
 Rachis glabrous. Pinnules rigid, glabrous, minutely rough below . 5. *A. Cunninghamii*.  
 Rachis pubescent above. Pinnules rigid, hirsute or setulose below . 6. *A. fulvum*.

1. **A. hispidulum**, Swartz;—*Fl. N. Z.* ii. 20. Frond broad, often 2-partite, 6–12 in. long, broadly fan-shaped or pedate, 2- or 3-pinnate; stipes dark-brown, shining, scabrid, 3–10 in. high; rachis hispid; branches spreading and rather recurved; pinnules stipitate, coriaceous, olive-green, striate, hispid, obliquely oblong, obtuse, often serrulate or acutely toothed, cuneate at the base,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long. Sori numerous, on the upper margins of the pinnules, situated in the notches, red-brown, orbicular.—Hook. Sp. Fil. ii. 31; *A. pubescens*, Schkuhr; *A. pedatum*, Forst., not Linn.

**Northern** Island: common from the Bay of Islands to Cook's Straits. **Kermadec** Islands, *Macgillivray*. Also found in India, Africa, Australia, and the Pacific islands.

2. **A. affine**, Willdenow;—*Fl. N. Z.* ii. 20. Frond oblong or ovate in outline, pinnate or 2- or 3-pinnate, membranous, flaccid, sparingly branched; stipes 6–8 in. high and rachis slender, glabrous, polished, black; pinnules stipitate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, dimidiate-oblong, falcate, truncate at the tip, crenate on the upper margin, dark green, with a few scattered hairs on the upper surface. Sori few, scattered, in the notches of the fronds; involucre reniform or truncate, pale.—Hook. Sp. Fil. ii. 32; *A. trapeziforme*, Forst.; *A. setulosum*, J. Smith.

**Northern** and **Middle** Islands: common, *Forster*, etc. Also found in Norfolk Island.

3. **A. æthiopicum**, Linn.;—*Fl. N. Z.* ii. 21. Rhizome tufted. Frond oblong in outline, 1–3 in. broad, pale green or yellowish, flaccid, membranous, 3- or 4-pinnate; stipes 4–10 in. high, slender and with the almost capillary flexuous rachis black, glabrous, polished; pinnules stipitate, orbicular, perfectly glabrous, with cuneate bases,  $\frac{1}{4}$ – $\frac{1}{3}$  in. broad, upper margin lobed. Sori 2–6, in the notches; involucre rather large, reniform or transversely oblong, pale.—Hook. Sp. Fil. ii. 37. t. 77 A; *A. assimile*, Swartz; *A. trigonum*, Labill. Fl. Nov. Holl. t. 248, f. 2.

Abundant throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. Easily distinguished by its tufted rhizome, very slender glabrous habit, and rounded membranous pinnæ. A common fern in Australia, Tasmania, and many tropical countries.

4. **A. formosum**, Br.;—*Fl. N. Z.* ii. 21. Frond broad, deltoid, 4-pinnate or decomposed, primary branches remote; stipes 1–3 ft. high, stout, scabrid, shining, black; rachis flexuose, pubescent on the upper surface, shining and glabrous below; pinnules small, stipitate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, rigid, glabrous, oblong or obliquely rhomboid, obtuse, cuneate at the base, upper and outer margin crenate and toothed with retuse lobules, lower margin straight or arched. Sori upon the lobules or teeth of the pinnules; involucre transversely elongate, narrow.—Hook. Sp. Fil. ii. 51, t. 86 B.

**Northern** Island; banks of the Manganaitaka river, *Colenso*; Kaipara and Wangarei (*Mrs. Jones*). A native also of New South Wales and the Pacific islands.

5. **A. Cunninghamii**, Hook. Sp. Fil. ii. 52. t. 86 A;—*Fl. N. Z.* ii. 21. Rhizome creeping, scaly. Frond sparingly irregularly branched, deltoid



in outline, 2- or 3-pinnate, rarely pinnate; stipes 6-10 in. high, minutely scabrid below, smooth above, polished, black, as is the glabrous rachis; pinnules few, stipitate,  $\frac{1}{2}$  in. long, rigid, glabrous, often glaucous below or minutely roughened, obliquely oblong, obtuse, upper and outer margin crenate or lobed, lower margin entire. Sori numerous, small; involucre upon the lobes, reniform or suborbicular, with a narrow sinus.—*A. formosum*, A. Rieh.; A. Cunn., not of Brown.

**Northern and Middle Islands:** common, *Banks and Solander*, etc. Specimens growing in dense woods have sometimes variously lobed pinnules.

6. **A. fulvum**, *Raoul*;—*Fl. N. Z.* i. 22. Rhizome stout, creeping, scaly. Frond 1-2 $\frac{1}{2}$  ft. high, olive green, ovate-deltoid, sub-pedately 3- or 4-pinnate; stipes scabrous, black; rachis scabrous, strigose above; pinnules hard, coriaceous, glabrous above, with strigose stalks, hirsute or setulose below, obliquely dimidiate-oblong or subfalcate, obtuse, lobulate. Sori on the lobules, numerous, rather large; involucres orbicular-cordate.—Hook. Sp. Fil. ii. 53. t. 85 A.

**Northern and Middle Islands:** rather common in dry woods, *Raoul*, etc. The coriaceous hispid pinnules and larger sori distinguish this at once from *A. formosum*; and the ramification and sori on the lobules from *A. hispidum*, which it approaches very closely.

## 12. HYPOLEPIS, Bernhardi.

Rhizome stout, creeping.—Fronds usually large, 2-4-pinnate, often glandular-pubescent; veins forked, free, never netted. Sori globose, near the margin, on the tips of the veins, not confluent, covered more or less completely by an incurved tooth of the frond, which forms a spurious involucre.

This genus is, I think, only a section of *Polypodium*, the so-called involucre being merely the incurved tip of the segment on which the sorus is placed. In proof of this, the *H. tenuifolia* may be seen to pass directly into *Polypodium rugulosum*. As, however, these genera are kept distinct by all authors, I have retained *Hypolepis*. The following species may prove forms of one or two at the most.

Frond 2-5 ft., deltoid, 3- or 4-pinnate, glandular.	Rhizome scaly	1. <i>H. tenuifolia</i> .
Frond 6-12 in., deltoid, 3-pinnate, glabrate.	Rhizome naked	2. <i>H. Millefolium</i> .
Frond 6-18 in., rigid, ovate-elongate, glabrous.	Rhizome scaly and woolly	3. <i>H. distans</i> .

1. **H. tenuifolia**, *Bernhardi*;—*Fl. N. Z.* ii. 22. Rhizome long, stout, creeping, scaly. Frond large, sometimes 2 ft. broad, deltoid, glandular-pubescent or glabrate, rather membranous or coriaceous, pale or dark green, 3- or 4-pinnate; stipes 1-2 ft. high, stout, erect, brown, scabrid or pubescent; rachis glandular-pubescent, rarely glabrous; primary branches spreading, ovate or oblong, acuminate, secondary and tertiary more lanceolate; pinnules sessile, linear-oblong, obtuse, pinnatifid, segments oblong, obtuse, crenate-toothed, the teeth forming reniform involucres.—Hook. Sp. Fil. ii. 60. t. 19; *Cheilanthes arborescens*, Swartz; *C. pellucida*, Colenso; *C. ambigua*, A. Rich.; *C. dicksonioides*, Endlicher; *Lonchitis tenuifolia*, Forst.

**Northern and Middle Islands**, abundant: *Banks and Solander*, etc. **Kermadec Islands**, *Macgillivray*. A common Australian and Tasmanian fern, found also in many other parts of the world. Forster erroneously described it as arborescent.

2. **H. Millefolium**, *Hook. Sp. Fil.* ii. 68. t. 95;—*Fl. N. Z.* ii. 23.

Rhizome slender, creeping, not scaly. Frond 8–16 in. long, glabrate; broadly ovate or deltoid, 3-pinnate; stipes and rachis sparingly glandular and pilose, pale; primary branches few, ovate or lanceolate, secondary  $\frac{3}{4}$  in. long, shortly stipitate, linear-oblong, obtuse, tertiary also stipitate and similar, pinatifid or lobulate, the segments crenate. Sori solitary on the lobes or crenatures of the pinnules.

**Northern** Island: shady places, top of the Ruahine mountains, *Colenso*. **Middle** Island: Nelson, Lake Rotuiti, *Munro*; Southern Alps, *Sinclair and Haast*; Otago, *Lindsay*. This approaches very closely some forms of *Polypodium rugulosum*.

3. **H. distans**, *Hook. Sp. Fil.* ii. 70. t. 95 C;—*Fl. N. Z.* ii. 23. Rhizome rigid, dark-brown, scabrid and aculeate, woolly and covered with scaly brown hairs. Frond 6–12 in. long, rigid, sparingly branched, 2-pinnate, linear-ovate, acuminate; stipes 8–12 in. high, slender, and rachis red-brown and rough with scattered small prickles; primary branches distant, opposite, narrow linear-lanceolate; pinnules numerous, shortly stipitate, rather distant, linear-oblong, obtuse,  $\frac{1}{4}$  in. long, glabrous, crenate lobed or pinatifid. Sori minute.

**Northern** Island: near Cape Maria Van Diemen, *Edgerley*; Hokianga, Hutt Valley, and Taranua, *Colenso*; Manakau Heads (*Mrs. Jones*). **Middle** Island: Canterbury, *Travers*; Otago, *Hector and Buchanan*.

### 13. CHEILANTHES, Swartz.

Rhizome in the New Zealand species stout, short, scaly.—Fronds tufted, rigid, erect, 2- or 3-pinnate. Veins forked free. Sori small, rounded, numerous and close together, near the margins of the frond, terminating veins. Involucres formed of the continuously inflexed margin of the frond.

A considerable tropical and southern genus, chiefly distinguished from *Hypolepis* by the margin of the frond being continuously inflexed, and forming one long involucre over many sori. The only New Zealand species most closely resembles *Nothochlæna distans*, but is readily distinguished by its being glabrous.

1. **C. tenuifolia**, *Swartz*;—*Fl. N. Z.* ii. 23.—Var. **Sieberi**.—Rhizome 1–2 in. long, very stout, covered with long silky scales and old stipites of fronds. Fronds tufted, erect, linear-ovate or -oblong or deltoid, quite glabrous, coriaceous, contracted; stipes erect, 2–8 in. high, and rachis stout, brown, smooth, and shining or slightly hairy below; primary branches distant, erect; pinnules small, scattered, ovate- or linear-oblong, lobed or pinatifid, lobes obtuse or obtusely crenate, all soriferous. Sori sometimes so close as to be almost continuous and cover the back of the pinnules.—*Hook. Sp. Fil.* ii. 82; *C. Sieberi*, *Kunze*; *Pteris humilis*, *Forst.*

Abundant throughout the **Northern** and **Middle** Islands, in stony and rocky places, *Banks and Solander*, etc. A large state of this is a common and widely-dispersed fern in the south hemisphere. The var. *Sieberi* is common in Australia.

### 14. PELLÆA, Link.

Rhizome usually creeping.—Fronds rather tufted, pinnate in the New Zealand species, pedate and 2- or 3-pinnate in others. Veins pinnate, forked, free, very obscure. Sori continuous round the edges of the pinnules. Involucre

more or less membranous, formed of or continuous with the edges of the frond, opening inwards, continuous along the margin, at length recurved exposing the sorus.

A considerable tropical and temperate genus.

Erect. Pinnules lanceolate, falcate, acute . . . . . 1. *P. falcata*.  
Decumbent or prostrate. Pinnules orbicular . . . . . 2. *P. rotundifolia*.

1. ***P. falcata***, Br.—*Pteris*, Fl. N. Z. ii. 24. Rhizome short, wiry, rigid. Fronds tufted, 1–3 ft. high, rigid, erect, narrow-linear, pinnate; stipes black, hispid; rachis scaly and villous; pinnules quite glabrous, shortly stipitate, linear-lanceolate or oblong,  $\frac{2}{3}$ – $1\frac{1}{2}$  in. long, acute or mucronate, broadly obliquely cuneate at the base, which is sometimes gibbous above; veins very obscure. Sori broad, continuous round the pinnule; involucre very narrow.—Hook. Sp. Fil. ii. 135; *P. seticaulis*, Hook. Ic. Pl. t. 207.

**Northern** Island: Auckland, *Sinclair*. **Kermadec** Islands, *Macgillivray*. Also found in India, Tasmania, and Australia.

2. ***P. rotundifolia***, Forst.;—*Pteris*, Fl. N. Z. ii. 24. Rhizome short, wiry, rigid. Fronds tufted, rigid, generally decumbent or prostrate, very narrow linear, 6–24 in. long, pinnate; stipes and rachis hispid and scaly; pinnules broadly oblong or rounded, obtuse or mucronate, obliquely truncate at the base, glabrous, dark green; veins very obscure. Sori often in interrupted lines.—Hook. Sp. Fil. ii. 136; Fil. Exot. t. 48.

Abundant throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. Though, in its ordinary states, very unlike the preceding, intermediates occur.

## 15. PTERIS, Linn.

Rhizome usually creeping.—Fronds of various habit. Veins free forked or netted. Sori continuous along the edge of the frond. Involucre scarious or membranous, linear, continuous along the edge of the frond and confluent with its incurved margin, not recurved with age.

One of the largest genera of ferns, found in all quarters of the globe.

§ 1. EUPTERIS.—*Fronds* 2- or 3-pinnate. *Veins* forked, free.

Frond tall, rigid, glabrous or pubescent below. Pinnules decurrent. 1. *P. aquilina*.  
Frond tall, membranous, quite glabrous. Pinnules oblong, large . . . 2. *P. tremula*.  
Frond rigid, glandular-pubescent. Pinnules minute . . . . . 3. *P. scaberula*.

§ 2. LITOBROCHIA.—*Fronds* 2- or 3-pinnate. *Veins* netted.

Frond coriaceous, glaucous below . . . . . 4. *P. incisa*.  
Frond membranous. Pinnules stipitate, coarsely serrate . . . . . 5. *P. macilentia*.  
Frond membranous. Pinnules serrate at the tips only . . . . . 6. *P. Endlicheriana*.

1. ***P. aquilina***, Linn., var. ***esculenta***, Fl. N. Z. ii. 25. Rhizome subterranean, very stout, as thick as the thumb or more. Fronds solitary, sometimes 10 ft. high, 2–4 ft. broad, broad deltoid, 3- or 4-pinnate, rigid, coriaceous; stipes rigid, erect, grooved on one side, pale, glabrous, shining; branches spreading; pinnules linear, decurrent on the rachis, often hairy below; costa stout, often hairy; veins forked, free. Sori continuous, often all round the pinnule, and along their decurrent bases; involucre coriaceous.—Hook. Sp. Fil. ii. 196; *P. esculenta*, Forst.; Labill. Fl. Nov. Holl. t. 244.

Abundant throughout the islands, from the **Kermadec** to **Campbell's** Island: cover-

ing the hillsides over extensive areas, *Banks* and *Solander*, etc. The var. *esculenta*, distinguished chiefly by the decurrent pinnules, is common in the south temperate zone; the ordinary state of the plant is found over all other parts of the world. Rhizomes formerly roasted and eaten by the natives.

2. **P. tremula**, *Br.*;—*Fl. N. Z.* ii. 25. Frond 1–5 ft. high, rather membranous, broadly deltoid, 2- or 3-pinnate or decompound, quite glabrous, bright or pale-green; stipes and rachis perfectly smooth and polished; primary branches ascending; pinnules 1–2 in. long,  $\frac{1}{4}$  broad, linear, obtuse, sessile, decurrent, crenate, subacute; costa shining; veins forked, free; fertile pinnules entire, sometimes narrow-linear, with the involucres almost meeting at the costa.—*Hook. Sp. Fil.* ii. 174; *P. affinis*, *A. Rich.*; *P. tenuis*, *A. Cunn.* (form with narrow pinnules).

Abundant throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. Also frequent in Tasmania, Australia, and Chili.

3. **P. scaberula**, *A. Rich. Fl.* 82. t. 11;—*Fl. N. Z.* ii. 25. Rhizome stout, woody, hairy, and often scaly. Fronds 6–18 in. high, rigid, erect, coriaceous, yellow-green, glandular-pubescent or glabrate, ovate or linear-oblong, 2- or 3-pinnate; stipes and rachis stout, yellow-red, glandular-pubescent and scabrid; primary branches linear-lanceolate, stipitate; pinnules very small,  $\frac{1}{12}$ – $\frac{1}{4}$  in. long, substipitate, elliptic-oblong or obovate-oblong, crenate-serrate or entire, acute or obtuse, sometimes auricled at the base. Sori generally surrounding the whole pinnule.—*Hook. Sp. Fil.* ii. 174. t. 93 A.

Abundant throughout the **Northern** and **Middle** Islands: generally in woods, *Banks* and *Solander*, etc.

4. **P. incisa**, *Thunberg*.—*P. vespertilionis*, *Labill. Fl. Nov. Holl.* t. 245; *Fl. N. Z.* i. 26. Rhizome stout, glabrous. Fronds large, perfectly glabrous, glaucous below, broadly deltoid, 2–4 ft. high, membranous or rather coriaceous, 2- or 3-pinnate (rarely pinnate); stipes and rachis stout, quite glabrous, pale, polished, often glaucous; primary branches ovate-lanceolate; secondary linear-lanceolate, acute, often adnate at the base; pinnules broad-oblong or oblong-lanceolate, adnate or decurrent on the rachis,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, entire or obtusely lobed crenulate or pinnatifid; costa stout, flexuose; veins netted towards their bases.—*P. Brunoniana*, *Endl.*; *P. montana*, *Colenso*.

Abundant on skirts of woods throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. **Lord Auckland's** group, *J. D. H.* An Australian and Tasmanian fern; also found in the East and West Indies, South Africa, Chili, and Brazil.

5. **P. macilenta**, *A. Rich. Fl.* t. 12;—*Fl. N. Z.* ii. 26. Fronds large, tall, 1–5 ft. high, broadly deltoid, very membranous, flaccid, pale green, quite glabrous, rarely puberulous below, 2–4-pinnate; stipes and rachis quite smooth, shining; primary and secondary branches on long slender stalks; pinnules scattered; the uppermost adnate and decurrent on the rachis; lower on slender stalks, ovate-oblong, acute, deeply coarsely toothed serrate or lobed, especially towards the tip; costa flexuose; veins forked, netted towards their base only. Sori in the notches, broad.—*Hook. Sp. Fil.* ii. 219.

**Northern** Island: abundant in shady woods. **Middle** Island: Canterbury, *Haast*. One of the most beautiful of ferns, not found elsewhere.

6. **P. Endlicheriana**, *Agardh*.—*P. comans*, *Fl. N. Z.* ii. 26; ? of *Forst.*



Fronde large, tall, 1-5 ft. high, broadly deltoid, membranous, flaccid, glabrous or rarely puberulous, bright green, 2-pinnate; stipes and rachis glabrous, polished; primary branches ovate-lanceolate, acuminate; secondary narrower, pinnatifid, sometimes caudate; pinnules sessile, rarely stipitate, usually adnate and decurrent on the stipes, 1-1½ in. long, linear-oblong or linear, lobed or pinnatifid, the lobes serrate; costa straight; veins forked, netted at the base. Sori continuous or interrupted.—Hook. Ic. Pl. t. 973.

**Northern Island:** abundant, *Banks and Solander*, etc.; Waikate and Great Barrier Island, *Sinclair*. **Kermadec Islands,** *Macgillivray*. Also found in Tasmania, Australia, and Juan Fernandez. Closely allied to *P. tremula*, and best distinguished by the netted veins. I suspect it to be only a variety of Forster's *P. comans*.

# 16. LOMARIA, Willdenow.

Fronde usually tufted at the extremities of a stout prostrate or creeping rhizome, erect, rarely alternate and pendulous, of two forms, the outer barren or fertile at the base only, broader, the inner fertile narrower; veins free, simple or forked. Sori linear, close to the margin, continuous round the pinnules or lobes of the frond, often covering their whole lower surface. Involucre sometimes very obscure, linear, scarious, opening inwards, close to the margin and parallel to it, or continuous with it as in *Pteris*, sometimes reaching the costa.

A large southern and tropical genus, chiefly distinguished from *Pteris* by the habit, and the fertile fronds distinct from the barren.

*a. Barren fronds pinnate. Pinnæ much contracted at the base or stipitate.*

Rhizome very long, climbing. Fronds alternate, pendulous . . . 1. *L. filiformis*.

*Rhizome prostrate or erect, short, stout. Fronds tufted, erect.*

Fronde 1-4 ft., broad. Pinnules linear, very coriaceous . . . 2. *L. procera*.

Fronde 8-18 in., very narrow. Pinnules many, oblong or rounded, membranous. Stipes and rachis scaly . . . 3. *L. fluviatilis*.

Fronde 6-10 in., narrow. Pinnules oval-oblong, membranous. Stipes and rachis naked . . . 4. *L. membranacea*.

*β. Barren fronds pinnatifid, or pinnate at the very base only; fertile pinnate. Pinnæ attached by a very broad base.*

Rhizome wiry. Fronds 3-5 in., lanceolate. Pinnules oblong, membranous, crenulate . . . 5. *L. pumila*.

Rhizome stout. Frond deltoid. Pinnules falcate, coriaceous, lower deflexed . . . 6. *L. Vulcanica*.

Rhizome short, stout, creeping. Frond pendulous, large, coriaceous. Pinnules broad . . . 7. *L. elongata*.

Rhizome short, stout, erect. Frond linear. Pinnules oblong, rounded, membranous, green below . . . 8. *L. lanceolata*.

Rhizome short, stout, erect. Frond linear. Pinnules oblong, rounded, coriaceous, brown below . . . 9. *L. discolor*.

Rhizome long, creeping, scaly. Fronds alternate, linear. Pinnules coriaceous . . . 10. *L. attenuata*.

Rhizome slender, creeping. Frond 2-12 in., linear, fertile longest. Pinnules coriaceous, linear-oblong . . . 11. *L. alpina*.

Rhizome very short. Frond 2-12 in., linear, fertile shortest. Pinnules coriaceous, rounded or oblong . . . 12. *L. Banksii*.

Rhizome very short. Frond 8-12 in., lyrate-pinnatifid. Pinnules short, broad, membranous, black . . . 13. *L. nigra*.

*γ. Fronds 2-pinnate or 2-pinnatifid.*

Rhizome erect, slender. Frond ovate-lanceolate . . . . . 14. *L. Fraseri*.

1. ***L. filiformis***, *A. Cunn.*—*Stenochlæna heteromorpha*, J. Smith;—*Fl. N. Z.* ii. 46. Rhizome climbing lofty trees, stout, woody, covered with chaffy scales. Fronds alternate, pendulous, 6–24 in. long, linear, pinnate; stipes rigid, often chaffy; pinnules numerous, stipitate, jointed on to the rachis; barren glabrous, coriaceous, 2–3 in. long, linear-lanceolate, falcate, finely crenulate or serrulate, rounded at the base, tapering to a long point, in young plants small, membranous, orbicular or oblong, crenate or lobed; costa stout; veins forked, free, parallel; fertile pinnules filiform; involucre very inconspicuous.—Hook. Sp. Fil. iii. 333. t. 149; *L. propinqua*, *A. Cunn.*; *L. pimpinellæ-folia*, Hook. f. in Lond. Journ. Bot. iii. 412.

Abundant throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. A similar and perhaps identical species is found in the Fiji Islands; a very remarkable plant, differing in several points from the other *Lomaria*.

2. ***L. procera***, *Sprengel*;—*Fl. N. Z.* ii. 27. Rhizome short, stout, often woody. Fronds tall, rigid, very coriaceous, pinnate, 1–4 ft. high, extremely variable in stature and form; stipes stout, short or long, chaffy and scaly at the base; rachis naked, or with a few scales; barren pinnules 3–20 pairs, linear-oblong, lanceolate or ensiform, stipitate, or the upper adnate to the rachis, acute acuminate or caudate, narrowed truncate or auricled at the base, 2–12 in. long, minutely toothed; costa naked or chaffy; veins numerous; lowest pinnule sometimes orbicular or cordate, uppermost sometimes elongate and erect; fertile pinnules narrower, on separate fronds, or on the bases of the barren.—Hook. Sp. Fil. ii. 22;  *Ic. Plant.* t. 407, 408; *L. latifolia*, *Colenso*; *Stegania procera*, *Br.*; *Blechnum procerum*, *Labill.* *Fl. Nov. Holl.* t. 247; *Parablechnum procerum*, *Presl*; *Osmunda procera*, *Forst.*

Var. *α*. Tall, robust, coriaceous; barren pinnules obliquely truncate or cuneate at the base.

Var. *β*. Tall, robust, coriaceous; barren pinnules auricled at the base, often 1 ft. long.

Var. *γ*. Tall, robust; barren pinnules narrowed at the base.

Var. *δ*. *Fl. N. Z.* ii. t. 75. Smaller, less coriaceous; pinnules few, barren truncate or auricled at the base, upper adnate.—Hook. Garden Ferns, t. 53; *Stegania minor*, *Br.*

Abundant throughout the islands, from the **Kermadec** Islands to **Campbell's** Island: in all situations, generally in humid, often marshy. Found throughout the southern hemisphere, and as far north as Mexico. One of the most variable of ferns; the varieties enumerated keep their characters under cultivation.

3. ***L. fluviatilis***, *Sprengel*;—*Fl. N. Z.* ii. 28. Rhizome stout, often woody, chaffy. Fronds tufted, slender, narrow-linear, 8–18 in. high, 1–2 broad, pinnate; stipes chaffy at the base and often the rachis with long scales; pinnules numerous, barren ones rounded or linear-oblong, obtuse, waved or crenate at the tip,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, lower shortly stalked, upper adnate, uppermost confluent; fertile pinnules narrow-linear, erect, obtuse,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long.—Hook. Sp. Fil. iii. 34; *L. rotundifolia*, *Raoul*, *Choix*, t. 2 B, and *Colenso*, in *Tasm. Phil. Journ.*; *Stegania fluviatilis*, *Br.*

Abundant in hilly parts of the **Northern**, and throughout the **Middle** Island. Also found in Tasmania and South-eastern Australia.

4. ***L. membranacea***, *Colenso*. Rhizome very short, stout, with wiry roots, scaly at the top. Fronds tufted, erect, membranous, green, 6–10 in.

high, linear-lanceolate, pinnate, subflexuose; stipes short, and rachis without scales; barren pinnules oval-oblong, broadly adnate, not decurrent, obtuse, dentate-serrate, uppermost confluent, lowermost suborbicular; fertile fronds longer than the barren, with a longer stipes, and remote, linear, sessile apiculate pinnules, the lowest minute.—Hook. Sp. Fil. iii. 35. t. 145.

**Northern** Island: Bay of Islands, common, *Colenso*, etc.; Waiheke Island, Auckland, *Jolliffe*. **Middle** Island: Otago, *Hector and Buchanan*. Closely allied to *L. fluviatilis*.

5. ***L. pumila***, *Raoul, Choix*, t. 2 A;—*Fl. N. Z.* ii. 28. Rhizome slender, creeping, with wiry roots, and chaffy fulvous scales at the tip. Fronds tufted, membranous, lanceolate, rather obtuse, tapering to the base, 3–5 in. long, barren pinnatifid; stipes slender, chaffy at the base; rachis slender, glabrous; pinnules ovate or ovate-oblong,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, obtuse, entire or subcrenate; fertile fronds with longer stipes, pinnate; pinnules oblong, obtuse, mucronate, more or less decurrent at the base.—Hook. Sp. Fil. iii. 19.

**Middle** Island: Akaroa, *Raoul*.

6. ***L. vulcanica***, *Blume*;—*Fl. N. Z.* ii. 29. Rhizome stout, woody, often as thick as the wrist. Fronds tufted, coriaceous, 4–18 in. long, ovate-lanceolate or deltoid, pinnatifid above, almost pinnate below; stipes slender, pale, crinite with blackish chaffy bristles at the base; barren pinnules close-set,  $1\frac{1}{2}$ –3 in. long, adnate by a broad base, lower decurved, falcate, acuminate, rarely obtuse, margin thickened, entire or irregularly crenate, glabrous or pubescent on the rachis and costa; fertile pinnules very narrow; involucre lacerate.—Hook. Ic. Pl. t. 969; Sp. Fil. iii. 13; *L. deflexa* and *deltoides*, *Colenso*.

**Northern** Island: Tarawera, east coast, etc., *Colenso*; Auckland, *Sinclair*; Taranaki, etc. (*Mrs. Jones*). **Middle** Island: Nelson (*Mrs. Jones*); Otago, subalpine, *Hector and Buchanan*. Also found in Tasmania, Java, and some of the Pacific Islands. *Colenso* sends a small state with an enormous rhizome and small fronds (var. *nana*, Hook. Sp. Fil. l. c.).

7. ***L. elongata***, *Blume*;—*Fl. N. Z.* ii. 29. Rhizome short, creeping. Fronds alternate, very coriaceous, glabrous, pendulous, 1–3 ft. long, smooth, shining, dark-green, entire lobed or pinnatifid; stipes stout, with a few large scales, winged; rachis broadly winged; barren fronds pinnatifid; pinnules few, remote, 1–2 in. broad, 2–5 in. long, linear-lanceolate, falcate, acuminate, often serrate at the tip, each decurrent and connate with the next below it; veins terminating in a depression within the margin; fertile fronds pinnatifid; pinnules very slender, 3–10 in. long. Involucre with torn edges.—Hook. Sp. Fil. iii. 3. t. 143; *L. Colensoi*, Hook. f. in Ic. Pl. t. 627, 628; *L. heterophylla*, *Colenso*.

Mountainous parts of the **Northern** Island: Waikare lake, *Colenso*; Port Nicholson, *Sinclair*; Mount Egmont (*Mrs. Jones*). **Middle** Island: Ship Cove, *Lyall*; Otago, *Hector and Buchanan*. Also found in Java, India, and the Malay and Pacific Islands.

8. ***L. lanceolata***, *Sprengel*;—*Fl. N. Z.* ii. 29. Rhizome stout, erect or ascending, sometimes 2 ft. high. Fronds tufted, erect, pale-green, 1–2 ft. high, rather membranous, quite glabrous, narrow-linear or elongate, lanceolate, acuminate, narrowed below; barren fronds pinnatifid or pinnate at the very base; stipes short, stout, with long black subulate scales at the base; rachis and costa quite glabrous; pinnules of barren fronds numerous, close set,

oblong-lanceolate, subfalcate, obtuse acute or acuminate, quite entire or waved or crenate, lower orbicular and sometimes distant; fertile fronds shorter, with distant linear, acute or acuminate pinnules.—Hook. Ic. Pl. t. 429; Sp. Fil. iii. 11.

Abundant throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* Also very common in Tasmania, South-east Australia, some of the Pacific Islands; also in South America if, as I believe, *L. blechnoides*, Bory, is the same plant.

9. **L. discolor**, *Willdenow*;—*Fl. N. Z.* ii. 30. Very similar to *L. lanceolata*, but usually larger, often 3 ft. high; rhizome the same; fronds forming an elegant crown, red-brown below, coriaceous, the pinnules narrower; those of the fertile fronds are often leafy at the base.—Hook. Sp. Fil. iii. 5; *L. lanceolata*, *Fl. Antarct.* i. 110, not Sprengel; *Onoclea nuda*, Labill. *Fl. Nov. Holl.* t. 246; *Osmunda discolor*, Forst.

Abundant throughout the **Northern** and **Middle** Islands, **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* Very common in South-east Australia and Tasmania.

10. **L. attenuata**, *Willdenow*. Rhizome long, creeping, stout, densely clothed with chaffy, fulvous, shining scales. Fronds alternate, 1–2 ft. long, coriaceous; barren pinnatifid, pinnate at the very base, broadly lanceolate, very attenuate below; stipes short, scaly; pinnules horizontal, close together, with a narrow acute sinus, becoming gradually smaller downwards, acuminate or truncate and emarginate, entire or subserrate; fertile fronds with more remote, linear, sessile, apiculate or acuminate pinnules.—Hook. Sp. Fil. iii. 6.

**Kermadec** Islands, *Macgillivray*. Also found in Norfolk Island and in tropical countries of the Old and New World.

10. **L. alpina**, *Sprengel*;—*Fl. N. Z.* ii. 30. Rhizome creeping, chaffy, slender. Fronds tufted, coriaceous, quite glabrous, dark green, 2 in.–2 ft. high, linear,  $\frac{1}{2}$ – $\frac{2}{3}$  in. broad, pinnatifid or pinnate at the very base only, narrowed above and below; stipes and rachis stout, smooth, sometimes scaly here and there; pinnules of barren fronds very numerous, close, linear-oblong, obtuse, sessile by a broad base; fertile fronds longer than the barren, pinnate; pinnules remote, spreading or deflexed and curving upwards, linear, obtuse, lower remote, rounded, often without sori. Involucre scarious.—Hook. Sp. Fil. iii. 16; *Fl. Antarct.* t. 150; *L. linearis*, Colenso.

Common in subalpine districts throughout the **Northern** and **Middle** Islands. Not found hitherto in Lord Auckland's group and Campbell's Island, though common in the mountains of Tasmania, Chili, Fuegia, and the other antarctic islands.

12. **L. Banksii**, *Hook. f. Fl. N. Z.* ii. 31. t. 76. f. 1. Rhizome prostrate, stout, woody, covered with matted fibres, chaffy at the ascending tip. Fronds tufted, numerous, quite glabrous, coriaceous, 6–18 in. high, very narrow-lanceolate, pinnatifid, the fertile shorter, pinnate; stipes winged, scaly at the base and rachis, very stout, naked; pinnules numerous, close set, half orbicular or very broadly oblong, rounded at the tip, quite entire, sessile by a very broad base; the lower decurrent and often forming a wing to the stipes; fertile pinnules shorter and narrower, spreading, curved or straight.—Hook. Sp. Fil. iii. 17.

Common in dark woods, throughout the **Northern** and **Middle** Islands, *Banks* and



*Solander*, etc. The very broad coriaceous pinnules, altogether adnate, best distinguish this. A very similar and, I think, identical species, occurs in Chili.

13. **L. nigra**, *Colenso* ;—*Fl. N. Z.* ii. 31. Rhizome short, indistinct. Fronds tufted, small, 8–12 in. high, dark green, blackish and brittle when dry, lanceolate, obtuse, quite glabrous, or pubescent below and on the margin, rather membranous; stipes and rachis scaly; barren fronds often lyrate-pinnatifid or -pinnate; pinnules few, often interrupted, oblong, obtuse, sinuate-crenate, upper usually largest, lobed, lower sometimes also large stalked and deflexed; fertile fronds pinnate; pinnules few, distant, suberect, narrow-linear, tip subulate or apiculate, terminal often elongate.—Hook. Ic. Pl. t. 960; Sp. Fil. iii. 35; *Polybotrya nana*, Fée, *Acrost.* t. 38. f. 1.

**Northern** Island: in dark moist woods, by watercourses, etc.; east coast and interior, *Colenso*, *Sinclair*, etc. **Middle** Island: Milford Haven and Bligh's Sound, *Lyall*, *Hector* and *Buchanan*.

14. **L. Fraseri**, *A. Cunn.* ;—*Fl. N. Z.* ii. 31. Rhizome slender, erect, like that of a small tree-fern, sometimes 2–3 ft. high, as thick as the thumb, black, covered with the bases of old stipes. Fronds tufted, very numerous at the top of the rhizome, 8–18 in. high, ovate or ovate-lanceolate, 2-pinnatifid, quite glabrous, rather membranous; stipes scaly at the base, quite glabrous, as is the rachis, both are interruptedly winged, the wing sharply angled and lobed; primary branches 2–4 in. long,  $\frac{2}{3}$  broad, tapering to a long point; pinnules crowded, linear-oblong, acute, quite entire or serrate; fertile frond narrower than the barren, sometimes 2-pinnate, caudate; segments sometimes stipitate. Involucres marginal, recurved.

**Northern** Island and northern parts of the **Middle** Island: Bay of Islands, *Fraser*, etc.; Auckland, *Sinclair*; Massacre Bay, *Lyall*. Not found except in New Zealand.

## 17. DOODIA, Br.

Fronds tufted on a very short rhizome, simply pinnate, erect or prostrate, the inner often the most fertile. Veins free, simple or forked, uniting again only where the sorus is placed. Sori oblong or reniform, distant from the margin, parallel to the costa. Involucres of the same shape, membranous or scarious, attached by one side to a transverse vein, opening towards the costa.

A small genus, confined to the southern Pacific Islands, Australia, Java, and Ceylon. The following species, I think, all pass into one another.

Fronds erect, pinnatifid in upper $\frac{1}{2}$ – $\frac{2}{3}$ . Pinnules 3–6 in. . . . .	1. <i>D. connexa</i> .
Fronds erect, pinnatifid in upper $\frac{1}{2}$ or $\frac{1}{3}$ . Pinnules 1–2 in. . . . .	2. <i>D. media</i> .
Frond usually decurved or prostrate, pinnate nearly to the top. Pinnules $\frac{1}{2}$ –1 in. . . . .	3. <i>D. caudata</i> .

1. **D. connexa**, *Kunze*. Fronds tufted, 1–2 ft. high, erect, lanceolate, rather membranous, pinnate below, pinnatifid above the middle or lower one-third; stipes stout, black; rachis smooth, naked; pinnules close-set, horizontal, 3–6 in. long, very narrow linear-lanceolate, attenuate at the tip, sharply serrate, bright green, lowest truncate or auricled at the base. Sori in 1–3 series on each side the costa.—Hook. Sp. Fil. iii. 75.

**Kermadec** Islands, *Macgillivray*. Also found in the Society and other Pacific groups.

2. **D. media**, Br. Rhizome short, stout, ascending. Fronds tufted, 6–12 in. high, suberect, lanceolate, rather rigid, pinnatifid above, pinnate below; stipes black, 3–5 in. long, with subulate scales at its base, sometimes scabrid; rachis smooth, naked; pinnules close together, spreading, linear-oblong, obtuse, upper decurrent at the base, lower auricled, uppermost generally elongate and subcordate, all rigid, spinulose or toothed. Sori in one series.—Hook. Sp. Fil. iii. 74; *D. Kunthiana*, Gaudichaud in Freycinet's Voy. t. 14.

**Northern Island**: on clay hills, etc., common. Very common in Australia, Norfolk Island, and some of the Pacific Islands.

3. **D. caudata**, Br.;—*Fl. N. Z.* ii. 37, *excl. synonyms*. Very closely allied to *D. media*, and probably a variety of it, but more flaccid, the fronds often prostrate, pinnate nearly to the top, fertile more distinct from the barren and longer.—Hook. Sp. Fil. iii. 75; *Exot. Flora*, t. 25.

**Northern Island**: common, *A. Cunningham*, etc. The fragrant fern which occurs in the Wellington Valley appears to be a variety of this. A common Australian and Tasmanian fern.

## 18. ASPLENIUM, Linn.

Fronds tufted on a usually very short rhizome, or with no rhizome, usually green, coriaceous, flaccid, pinnate 2- or 3-pinnate or decompose (never entire in New Zealand); venation various. Sori linear or oblong, parallel to and upon the veins, oblique with regard to the costa, distant from the margin, except when the frond is decompose. Involucre membranous, of the same form as the sorus, attached laterally to a vein, opening towards the costa.

One of the largest and the most difficult genera of ferns, because the fronds of many of the species vary extremely from simple to decompose, and from almost membranous to coriaceous, etc. None of the New Zealand species have quite simple fronds, nor have any the double involucre of the *Diplazium* section. Of the species here described, numbers 4, 5, and 12 are quite distinct from one another and from all the others; 6 and 7 pass into one another, but not into others; 1, 2, and 3 pass into one another and into 8, 9, 10, and 11, which together form a network of varieties, of which the characters given are those of prevalent forms only; thus there are only 5 universally separable forms in the Island.

**A. EUASPLENIUM.** Veins free. Involucre flat.

**a.** Fronds pinnate, sometimes 2-pinnate below in 3. Sori several on each pinnule, not close to the margin (see *A. Hookerianum*, in  $\beta$ ).

### 1. Rhizome stout or 0.

- |  |                               |
|--|-------------------------------|
| Frond 3 in.–3 ft., stout. Pinnules oblong, crenate or serrate. Sori oblong or linear . . . . .                                   | 1. <i>A. obtusatum</i> .      |
| Frond 1–2 ft., very stout. Pinnules narrow-lanceolate, very coriaceous, serrate or pinnatifid. Sori short . . . . .              | 2. <i>A. scleroprium</i> .    |
| Frond 1–2 ft., stout. Pinnules oblong-lanceolate, serrate. Sori linear, very long . . . . .                                      | 3. <i>A. lucidum</i> .        |
| Frond 2–12 in., slender, erect. Pinnules $\frac{1}{4}$ in., shortly oblong or obovate. Veins distant. Sori in 2 series . . . . . | 4. <i>A. Trichomanes</i> .    |
| Frond 2–18 in., slender, prostrate, rooting at the naked tips. Pinnules rounded. Veins flabellate. . . . .                       | 5. <i>A. flabellifolium</i> . |

### 2. Rhizome creeping, scaly, slender.

- |   |                         |
|---|-------------------------|
| Frond 1–2 feet. Pinnules 2–4 in., lanceolate, caudate. Veins very close-set . . . . . | 6. <i>A. caudatum</i> . |
|---|-------------------------|

Frond 1-2 ft. Pinnules 4-6 in., lanceolate, acuminate. Veins very close-set . . . . . 7. *A. falcatum*.

β. Fronds 2- or 3-pinnate, segments usually narrow. Sori generally 1 on each segment and close to its margin.

Frond 4-12 in., erect, membranous, oblong, pinnate or 2-pinnate. Pinnules stalked . . . . . 8. *A. Hookerianum*.

Frond flaccid, erect or pendulous, 1-3 ft., 2- or 3-pinnate, ovate-lanceolate, often proliferous . . . . . 9. *A. bulbiferum*.

Frond 3-5 in., stout, erect, ovate, acuminate. Pinnules sessile . . . . . 10. *A. Richardi*.

Frond 1-2 ft., very coriaceous, ovate linear or lanceolate. Pinnules very narrow, linear or lanceolate . . . . . 11. *A. flaccidum*.

B. *ATHYRIUM*. Fronds 2- or 3-pinnate. Veins forked. Involucre cylindric, often irregularly torn, several on a segment.

Frond tall, very broad, deltoid, membranous . . . . . 12. *A. australe*.

1. ***A. obtusatum*, Forst.**;—*Fl. N. Z.* ii. 33. Rhizome short, thick, woody. Fronds very coriaceous, 3 in.-3 ft. high, erect or pendulous, linear or oblong-linear, pinnate; stipes very stout, with shining lanceolate scarious scales at its base; rachis stout, compressed, margined, glabrous or with a few weak hairs; pinnules 1-4 in. long, stipitate, oblong or linear- or oblong-lanceolate, obtuse or acute, truncate cuneate or rounded at the base, coarsely crenate or serrate, uppermost confluent. Veins usually simple. Sori linear or oblong, oblique.—Hook. Sp. Fil. iii. 96; Fil. Exot. t. 46; Labill. Fl. Nov. Holl. t. 242.

Var. β. *obliquum*. Pinnæ generally longer, more acute. Sori linear, more numerous. *A. obliquum*, Forst.; Labill. l. c. t. 242. f. 1. *A. apicidentatum*, Homb. and Jacq. Voy. au Pôle Sud, Bot. t. 1 A.

Abundant, both varieties, throughout the islands, especially on maritime cliffs, from **Kermadec** Islands, *Macgillivray*, to **Campbell's** Island, *J. D. H.* Common throughout the south temperate zone.

2. ***A. scleroprium*, Homb. and Jacq. Voy. Pôle Sud, Bot. t. 1 D.** Very similar to *A. obtusatum*, but more thick and coriaceous, with narrow-lanceolate, caudate-acuminate, entire serrate or almost pinnatifid pinnules. Sori extending to the margins of the segments.—Hook. Sp. Fil. iii. 98; *A. flaccidum*, β. *aucklandicum*, Fl. Antaret. 109.

**Lord Auckland's** group: common in woods near the sea, *Hombon and Jacquinet, J. D. H., Bolton*. This is a transition form between *A. obtusatum* or *lucidum* and *A. flaccidum*.

3. ***A. lucidum*, Forst.**;—*Fl. N. Z.* ii. 33. Habit and characters of *A. obtusatum*, but larger, more flaccid, bright green, shining; fronds sometimes 2 ft. long and broad; pinnules usually oblong-lanceolate, serrate, often 6 in. long, upper base rounded incised or lobed. Sori numerous, linear, very long.—Hook. Sp. Fil. iii. 98.

Var. β. *paucifolium*. Dwarf; pinnules 3-7, terminal much elongate. Hook. l. c. 99.

Var. γ. *Lyallii*, Fl. N. Z. ii. 33. t. 77. Lower pinnules again pinnate, the next deeply lobed.

Abundant from **Kermadec** Islands, *Macgillivray*, to Otago, *Banks and Solander*, etc. Var. γ. Otago, *Lyall*. This passes on one hand into *A. obtusatum*, and on the other into *bulbiferum*, through γ. *Lyallii*, and into *flaccidum* through *scleroprium*, and others.

4. ***A. Trichomanes*, Linn.** Rhizome short, thick, fibrous. Fronds

numerous, linear, erect, 3–12 in. long, pinnate; stipes smooth, polished, margined, black; pinnules numerous, rather coriaceous, small, horizontal, scarcely stalked,  $\frac{1}{4}$  in. long, oblong or obovate, obliquely cuneate at the base, upper margin near the base rounded truncate or auricled, lower excised, entire or crenate; veins distant oblique, usually forked. Sori oblique, in 2 series; involucre pale brown, membranous, entire or jagged.—Hook. Sp. Fil. iii. 136.

**Middle** Island: Kaikoras Mountains, *Sinclair*; Acheron valley, *Travers*; Canterbury, Southern Alps, *Sinclair and Haast*; Otago, lake district, *Hector and Buchanan*. A very common fern throughout the northern temperate hemisphere; also found in South Africa, Australia, Tasmania, the Sandwich Islands, and the Andes of South America.

5. **A. flabellifolium**, *Cavanilles*;—*Fl. N. Z.* ii. 33. Rhizome 0. Fronds tufted, flaccid, spreading decumbent or pendulous, often rooting at the long tips, 4–18 in. long, linear, pinnate; stipes and rachis smooth, naked or with a few small black scales, slender, green; pinnules numerous, very variable,  $\frac{1}{4}$ – $\frac{2}{3}$  in. long, shortly stalked, bright green, orbicular or rhomboid, cuneate or reniform at the base; outer margin coarsely crenate or lobed; veins flabellate. Sori 3 or 4, radiating from the base of the pinnules; involucre pale brown, membranous.—Hook. Sp. Fil. iii. 146; *A. flabelliforme*, Hook. Exot. Flora, t. 208.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc., on rocks and in stony places. Also frequent in Australia and Tasmania.

6. **A. caudatum**, *Forst.* Rhizome stout, terete, creeping. Fronds broadly lanceolate, acuminate, 1–2 ft. long, very coriaceous, pinnate, pinnatifid towards the tip; stipes below, and young rachis brown and clothed with large, falcate, imbricate, subulate, shining scales; pinnules rather remote, 2–4 in. long, stalked, lanceolate from an obliquely cuneate subrhomboid base, long acuminate, upper base rounded or auricled, lower more or less excised, coarsely serrate or pinnatifid, lower serratures again cut; veins erecto-patent, generally forked. Sori linear, long, almost parallel to the costa, often confluent; involucre firm and membranous.—Hook. Sp. Fil. iii. 152; Schkuhr, Filices, t. 77.

**Kermadec** Island, *Macgillivray*. Also found in Australia, the Pacific and Malay Islands, and India. Apparently a form of *A. falcatum*.

7. **A. falcatum**, *Lamarck*.—*A. polyodon*, *Forst.*;—*Fl. N. Z.* ii. 34. Rhizome creeping, clothed with large brown scales. Fronds lanceolate or linear-lanceolate, coriaceous, 8 in.–2 ft. long, erect, pinnate; stipes long, brown, and rachis villous with slender scales; pinnules horizontal, long-stalked, 4–6 in. long,  $\frac{1}{2}$ – $\frac{3}{4}$  in. broad, lanceolate, cuneate at the base, gradually narrowed to an acuminate point, lobed or pinnatifid, upper base broader auricled, lower excised; veins close, erecto-patent with forked branches. Sori linear, numerous, giving a striate appearance to the pinnules; involucre narrow, firm, membranous.—Hook. Sp. Fil. iii. 160.

Common throughout the **Northern** Island, *Banks and Solander*, etc. A most abundant fern in all tropical and warm south temperate latitudes, but not extending into Tasmania. It passes into *A. caudatum*.

8. **A. Hookerianum**, *Colenso*.—*A. adiantoides*, var. *a*, *Fl. N. Z.* ii.



35. Rhizome short, fibrous. Frond 2–12 in. long, erect, oblong and pinnate or ovate and 2-pinnate, rather membranous; stipes slender, pale brown, with subulate scales at the base and narrower deciduous scales above; primary pinnæ 1–2 in. long, long stalked; pinnules rhombo-subrotund, stalked,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, lobed toothed or pinnatifid; veins subflabellate, dichotomous. Sori 3–5, oblong, on the disk of the pinnule; involucre membranous.—Hook. Sp. Fil. iii. 194; *A. adiantoides*, Raoul, Choix, t. 1, not of *Raddi*; Hook. Ic. Pl. t. 983.

Var. *β. Colensoi*, Moore. Pinnules shortly stalked, deeply cut into narrow segments, with the sori on their margins.—*A. Adiantoides*, *β Colensoi*, Hook. f. in Ic. Pl. t. 984; *A. Colensoi*, in Lond. Journ. Bot. iii. 26.

**Northern Island**: mountains of the east coast and interior, *Colenso*. **Middle Island**: Nelson and Canterbury alps, *Travers*; Akaroa, *Raoul*, *Lyall*; Otago, *Hector and Buchanan*. Var. *β*, Wairarapa valley, etc., *Lyall*, *Colenso*; Nelson, Canterbury, and Otago, *Sinclair*, *Travers*, etc. This passes into *A. Richardi* and *flaccidum*.

9. *A. bulbiferum*, *Forst.*;—*Fl. N. Z.* ii. 197. Rhizome stout, horizontal or oblique, scaly at the tip. Fronds flaccid, erect pendulous or declinate, bright-green, thinly coriaceous, 1–3 ft. long, ovate-lanceolate, pinnato-pinnatifid or 2- or 3-pinnate; stipes green, semiterete or compressed, scaly at the base and deciduously so above; pinnules often proliferous, 6 in. long, long-stalked, lanceolate, acuminate; segments  $\frac{1}{2}$ –2 in. long, ovate-oblong, pinnatifid. Sori on the disk of the more entire pinnules, and sides of the lobes of the more cut ones, oblique, short, oblong; involucre firm, greenish.—Hook. Sp. Fil. ii. 196; Ic. Pl. t. 423; Homb. and Jacq. Voy. au Pôle Sud, Crypt. t. 3.

Var. *β. laxa*. Fronds pendulous, decomposed; segments narrow.—*Cænopteris appendiculata*, Labill. Fl. Nov. Holl. t. 243; *A. triste*?, Raoul, Choix.; *A. laxum*, Br.; Homb. and Jacq. Voy. au Pôle Sud, t. 3 *bis*.

Var. *γ. tripinnata*. Fronds tripinnate, as in *A. flaccidum*, but more membranous.—*A. tremulum*, Homb. and Jacq. l. c. t. 3 *bis*.

Abundant in damp woods throughout the **Northern** and **Middle Islands**, on the ground, and on rocks and trees, *Banks and Solander*, etc. Also frequent in South-east Australia and Tasmania, and in some parts of India; it is united by varieties with all the other species of this section.

10. *A. Richardi*, *Hook. f. Fl. N. Z.* ii. 197. Rhizome short, stout, tipped with subulate scales. Fronds erect, 3–5 in. long, rather flaccid, ovate, acuminate, 2-pinnate; stipes stout; pinnæ stalked, 1–1½ in. long, close set, lanceolate; pinnules crowded, sessile, ovate or obovate, obtuse,  $\frac{1}{8}$ – $\frac{1}{3}$  in. long, pinnatifid; segments obtuse, upper confluent; veins one to each segment, forked, thickened at the tip. Sori solitary, broad, oblong, close to the margin of each segment; involucre membranous.—Hook. Sp. Fil. iii. 197, excl. var. *β*; *A. adiantoides*, var. *Richardi*, Hook. f. in Ic. Pl. t. 977; *A. Raoulii*, var. *Richardi*, Mettenius.

**Middle Island**: New River, *Herb. A. Richard*. A more erect plant than *A. Hookerianum*, with an ovate frond, closer pinnæ, and crowded sessile pinnules; its habit is that of erect states of *A. flaccidum*, but it is very much more membranous. I suspect, however, that it is nothing but a form of one of these species. In the 'Species Filicum' Sir W. Hooker refers *β Colensoi* of *A. Hookerianum* to this, but is now disposed to keep it where I had placed it; some specimens of this var. *β* appear to me to be absolutely intermediate.

11. **A. flaccidum**, *Forst.*;—*Fl. N. Z.* ii. 35. Rhizome stout, erect, crowned with large, subulate-lanceolate, membranous scales. Fronds usually pendulous, polymorphous, coriaceous, 6 in.–3 ft. long, generally greenish-white when dry, lanceolate, acuminate, pinnate or 2-pinnate; stipes stout, rather short, compressed or 3-gonous, scaly at the base; rachis winged; lower primary branches of frond 4–10 in. long, lanceolate, often caudate, stalked, pinnatifid or pinnate, middle branches pinnatifid; upper forked, or all much divided into linear-oblong, slightly incurved obtuse pinnules  $\frac{1}{3}$ – $\frac{2}{3}$  in. long; veins one in each segment. Sori oblong, near or on the very margins of the segments; involucre firm.—Hook. Sp. Fil. iii. 205; *A. heterophyllum*, A. Rich.; *Cænopteris flaccida*, Thunberg; Schkuhr, Fil. t. 82; *C. novæ-Zelandiæ*, Sprengel; *Darea flaccida*, Smith.

Var.  $\alpha$ . Fronds pendulous, 2-pinnatifid; pinnæ very narrow, distant, cut into deep narrow lobes.

Var.  $\beta$ . Fronds pendulous, pinnate; pinnæ incised or toothed; lobes linear, obtuse. Sori marginal.

Var.  $\gamma$ . Fronds erect or pendulous, pinnate; pinnæ falcate-lobed. Sori dorsal or half-dorsal. (Passing into *A. scleroprium*.)

Var.  $\delta$ . Fronds erect, rigid, deltoid, 2-pinnate; pinnæ ovate or lanceolate; pinnules shortly stipitate.

Var.  $\epsilon$ . Fronds 2–6 in., short, stout, ovate, 2- or 3-pinnate, like those of *A. Richardi*, but very thick and coriaceous. (An alpine form.)

Var.  $\zeta$ . Fronds large, lax, 3-pinnate.—*A. Shuttleworthianum*, Kunze; Hook. Sp. Fil. iii. 210.

Abundant throughout the **Northern** and **Middle** Islands: *Banks and Solander*, etc. **Lord Auckland's** group, *J. D. H.* Var.  $\epsilon$ . Alpine districts of both Northern and Middle Islands. Var.  $\zeta$ . **Kermadec** Islands, *Macgillivray*. Also a native of the more humid parts of Australia and Tasmania. One of the most variable ferns known.

12. **A. australe**, *Brackenridge*.—*A. Brownii*, Smith, in *Fl. N. Z.* ii. 36. Rhizome very stout, creeping. Frond very large, broad, flaccid, membranous, pale-green, 2–3 ft. high, broadly deltoid, spreading, 2- or 3-pinnate; stipes long, slender, smooth, polished, scaly at the base; rachis slender, flexuous, glabrous; primary branches linear-oblong, acute or acuminate; secondary pinnules 1–2 in. long, oblong-lanceolate, shortly stalked, pinnatifid or pinnate; pinnules linear-oblong, obtuse, crenate or incised; rarely entire; veins simple or forked. Sori several on each segment, nearer the costa than the margin; involucre cylindric, attached by both margins and bursting with a torn edge down one side or the middle.—Hook. Sp. Fil. iii. 233; *A. Brownii*, Hook. Ic. Pl. t. 978; *Allantodia australis* and *A. tenera*, Br.

**Northern** Island: in damp woods frequent, *Banks and Solander*, etc. **Middle** Island: Nelson, *Travers*. A very beautiful fern, also found in Norfolk Island, in South-eastern Australia and Tasmania, and under a slightly different form in India, the Malay Islands, Madeira, the Canaries, and various other parts of the world. In New Zealand this species becomes smaller and coriaceous in exposed localities.

## 19. ASPIDIUM, Swartz.

Rhizomes slender or stout and creeping, or forming a short, very stout, erect or inclined trunk.—Fronds in the New Zealand species erect, 2- or 3-pinnate, alternate on the slender rhizome or tufted on the end of the short trunk or stock; venation various, simple and free in the New Zealand species.

Sori on the back of the pinnæ, distant from the margin, on the middle of a vein, globose. Involucre orbicular, membranous, flat or convex, peltately attached to the centre of the sorus.

One of the largest genera of ferns, found in all parts of the globe. The *A. hispidum*, Swartz, is referred to the genus *Nephrodium*.

1. *Rhizome short, stout, woody, and scaly. Fronds tufted. Involucre flat or concave.*

Frond 2-pinnate, narrow, attenuate below. Scales on stipes large, broad, membranous, mixed with hairs . . . . . 1. *A. aculeatum*.

Frond rigid, 1- or 2-pinnate, oblong or ovate, not attenuate below. Scales on stipes narrow, black, rigid. Involucre with dark disk . . . 2. *A. Richardi*.

Frond rigid, 2-pinnate, not attenuate below. Scales on stipes rigid, black with white edges. Involucre with large black disk . . . . 3. *A. oculatum*.

*Involucre very convex, bullate, subglobose.*

Frond flaccid, narrow. Scales very large, pale, membranous . . . . 4. *A. cystostegia*.

2. *Rhizome creeping. Fronds rather membranous.*

Frond 2-4-pinnate, deltoid. Pinnules aristate . . . . . 5. *A. aristatum*.

Frond 2-4-pinnate, deltoid. Pinnules obtuse . . . . . 6. *A. coriaceum*.

Frond hispid with spreading bristles. (See *Nephrodium hispidum*.)

1. ***A. aculeatum*, Swartz; var. *vestitum*, Hook.**—*Polystichum vestitum*, Presl;—Fl. N. Z. ii. 38. Rhizome very stout, woody, erect or ascending, sometimes 2-4 ft. high. Fronds tufted, rather flaccid, forming a spreading crown, 1-3 ft. high, coriaceous, linear or ovate-oblong, 2-pinnate, gradually narrowed below, sometimes proliferous; stipes stout, covered with large, brown, ovate-lanceolate, acuminate, membranous, often lacerate, straight or curved scales, which are sometimes 1 in. long, and margined with white; rachis woolly with brown hairs, glabrate in age, and having a few scales also; primary divisions of frond very numerous, horizontal, linear-lanceolate, acuminate; pinnules numerous, ovate-oblong, pungent, sharply toothed or pinnatifid, segments shortly stipitate, pungent, lower outer margin auricled. Sori numerous; involucre orbicular, flat, stalked.—Hook. Sp. Fil. iv. 22; *A. pulcherrimum* and *A. waikarense*, Colenso; *A. venustum*, Hombr. and Jacq. Voy. au Pôle Sud, Bot. t. 4 and 5.

Abundant in the mountainous parts of the **Northern** Island, and throughout the **Middle** to **Campbell's** and **M'Quarrie's** Islands. Also very common in South-east Australia, Tasmania, and Fuegia; this differs a good deal from the prevalent European forms of *A. aculeatum*, but is connected by innumerable intermediates.

2. ***A. Richardi*, Hook.**—*Polystichum aristatum*, Fl. N. Z. t. 78. f. 5, not of Presl. Rhizome short, stout, scaly. Fronds 8 in.—2 ft. high, tufted, rigid, ovate-oblong or almost deltoid, not narrowed below, 1- or 2-pinnate, finely acuminate, glabrous or with white woolly hairs below; stipes and rachis slender, rigid, rough with scattered, narrow, subulate, black, rigid, deciduous scales, that have fimbriate bases; primary branches patent or ascending, lanceolate, acuminate, deeply pinnatifid or again pinnate; pinnules numerous, lanceolate or ovate-lanceolate, serrate, pungent, sessile or stalked, glabrous or woolly and scaly like the stipes below. Sori in 2 rows on each segment; involucre flat, with a small dark disk.

Var. *a*. Frond broader, 3-pinnate; pinnules spreading.—*A. coriaceum*, var. *acutidentatum*, A. Rich.

Var.  $\beta$ . Frond pinnate; pinnules ascending, pinnatifid at the base only.—*A. Richardi*, Hook. Sp. Fil. iv. 23, t. 122.

Abundant in woods, etc., throughout the **Northern** and **Middle** Islands. Var.  $\beta$  at the Bay of Islands only, *J. D. H.* This differs from *A. aristatum* in the rhizome not creeping, and much smaller, less pinnate fronds; from *A. oculatum* in the small scales, and wanting the large black disk to the involucre; and from *A. aculeatum* in the rigid habit, much smaller, broad, more coriaceous fronds, of an ovate form, not tapering to the base, and the free, less numerous primary pinnæ, and especially in wanting the large membranous scales of that plant. It seems to be confined to New Zealand and the Fiji Islands.

3. *A. oculatum*, Hook. Sp. Fil. iv. 24. t. 228. Rhizome absent. Fronds 10–20 in. long, coriaceous, ovate-oblong, acuminate, 3-pinnate, pale and clothed with woolly hairs below; stipes stout, straw-coloured, covered with rigid, large, subulate, brown scales margined with white; rachis with fewer, softer scales, and lax woolly hairs; primary divisions of the frond 2–4 in. long, narrow ovate-lanceolate, acuminate, stalked, not close together; secondary also lax,  $\frac{2}{3}$ –1 in. long, sessile or stalked; pinnules alternate, sessile, decurrent,  $\frac{1}{4}$  in. long, obtuse or mucronate, obtusely toothed or subpinnatifid. Sori abundant over the whole under surface, 2–4 on each segment; involucre orbicular, shortly stalked, with a large black disk and narrow reddish margin.

**Northern** Island: Wairarapa valley, *Colenso*. **Middle** Island: Akaroa, *Raoul*.

4. *A. cystostegia*, Hook. Sp. Fil. ii. 30. t. 127. Rhizome short, small. Fronds tufted, soft, rather flaccid, 4–10 in. high, pale green, narrow oblong-lanceolate, pinnate or 2-pinnate; stipes and rachis stout but brittle, clothed with copious, very large, convex, membranous, ovate, pale scales,  $\frac{1}{4}$ – $\frac{2}{3}$  in. long, with subulate tips; rachis similarly clothed; primary divisions distant below, crowded above,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long, spreading, pinnatifid or pinnate with a flat or winged rachis, segments or pinnules  $\frac{1}{4}$  in. long, ovate-lanceolate, obtuse or acute, entire or toothed, with a few long hairs below. Sori numerous and large; involucre bladdery, very membranous, with the edge turned down all round, forming a sort of globe.

**Northern** Island: Tongariro, *Dieffenbach*; Mount Egmont (*Mrs. Jones*). **Middle** Island: Discovery Peaks, alt. 5800 ft., *Travers*; Wairau gorge, alt. 4400 ft., *Sinclair*; between Lake Tennyson and the west coast, *Maling*; Canterbury on the Southern Alps, alt. 5–6000 ft., *Haast*; Otago, Mount Ida, *Dr. Buchanan*; lake district, alpine, *Hector*.

5. *A. aristatum*, *Swartz*; not *Polystichum aristatum*, Fl. N. Z. Rhizome long, stout, creeping, clothed with narrow, subulate, rusty scales. Fronds alternate, 1–2 $\frac{1}{2}$  ft. high, deltoid-ovate, acuminate, 3- or 4-pinnate, coriaceous, glossy; stipes stout and rachis criinite with subulate scales; primary divisions stipitate, lanceolate, finely acuminate, lowest with the lower secondary pinnæ much elongated and 2- or 3-pinnate; pinnules obliquely ovate or rhomboid-lanceolate, subfalcate, mucronate, serrate. Sori generally small, and often in two rows on each pinnule; involucre small, flat, orbicular or slightly reniform.—Hook. Sp. Fil. iv. t. 27; Schkuhr, Fil. t. 42.

**Kermadec** Islands, *Macgillivray*. A very common Pacific Island and Indian plant, not found in Africa or America.

6. *A. coriaceum*, *Swartz*.—*Polystichum coriaceum*, Fl. N. Z. iv. 32. Rhizome stout, creeping, very long, clothed with tawny silky scales. Fronds



distant, 1-4 ft. high, rigidly coriaceous, ovate-deltoid, acuminate, 3-pinnate; stipes stout, and rachis covered with deciduous scales; primary branches erecto-patent, stipitate, lower obliquely deltoid, acuminate, with the lower secondary divisions much elongated and divided; pinnules 1-2 in. long, ovate or lanceolate, entire or obtusely serrate or pinnatifid; segments oblong, obtuse, rarely acute, entire or obtusely serrate; veins sunk, veinlets close. Sori in 2 rows, nearer the costa than margin; involucre large, orbicular, with a deep sinus.—Hook. Sp. Fil. iv. 82; Schkuhr, Fil. t. 50; *A. Cunninghamianum*, Colenso; *Polypodium adiantiforme*, Forst.

**Northern** and **Middle** Islands: common in woods, etc., *Banks and Solander*, etc. An abundant fern throughout the south temperate zone.

## 20. NEPHRODIUM, Br.

Rhizome stout, erect creeping or ascending.—Fronds tufted or distant, 1-3-pinnate in the New Zealand species. Veins forked and free, rarely united in the New Zealand species. Sori on the back of the frond, distant from the margin, globose. Involucre kidney-shaped, fixed by the sinus to the centre of the sorus, membranous, often deciduous.

A very large tropical and temperate genus. Involucre sometimes absent in *N. velutinum*, often orbicular and peltate in *N. hispidum*.

### 1. EUNEPHRODIUM.—Primary veins pinnate; secondary angularly united.

Frond lanceolate, pinnate, pubescent . . . . . 1. *N. molle*.

### 2. LASTREA.—Veins and veinlets all free.

Frond lanceolate, pinnate, glabrous, with a few bullate scales . . . 2. *N. thelypteris*,  $\beta$ .

Frond deltoid or 5-angular, 2-4-pinnate, softly tomentose, brown when dry . . . . . 3. *N. velutinum*.

Frond deltoid or ovate, 2-4-pinnate, glabrous or pubescent, green when dry . . . . . 4. *N. decompositum*.

Frond rigid, 3- or 4-pinnate, pubescent below. Stipes, rachis, and costa hispid with stiff spreading bristles . . . . . 5. *N. hispidum*.

1. ***N. molle*, Desvauz.** Rhizome short, stout, horizontal, densely rooting. Fronds 1-3 ft. high, rather membranous and flaccid, oblong-lanceolate, abrupt or narrowed to the base, pinnate, pubescent on both surfaces; stipes and rachis green; pinnæ numerous, horizontal, sessile, 3-5 in. long, oblong or oblong-lanceolate, pinnatifid; pinnules variable in length, oblong, broad or narrow, obtuse, falcate; lowest veins uniting and sending forth a veinlet which is prolonged to the sinus, the rest free, simple or forked. Sori usually in 2 rows; involucres villous or pubescent.—Hook. Sp. Fil. iv. 67; *Polypodium molle*, Forst., and *Aspidium nymphae*, Forst.; Schkuhr, Fil. t. 34.

**Northern** Island?, *Forster*; Rotomabana (*Mrs. Jones*). **Kermadec** Islands, *Macgillivray*. One of the commonest of tropical and subtropical ferns, also found in New South Wales. The Rotomahana habitat I copy from Mrs. Jones's little work.

2. ***N. thelypteris*, Desvauz**; var.  $\beta$ , ***squamulosum*, Schlechtendal**, *Fil. Cap. t. 11*.—*Nephrodium squamulosum*, Fl. N. Z. ii. 39. Rhizome slender, creeping?, very long, black. Fronds scattered, 1-2 ft. high, membranous but firm, lanceolate, glabrous below, pinnate; stipes slender, pale, black at the base, naked or with the costa covered with scattered, pale, membranous, very convex scales; pinnæ subopposite, sessile, spreading, 1-1½ in.

long, linear-oblong, acuminate, deeply pinnatifid; pinnules  $\frac{1}{2}$  in. long, linear-oblong, obtuse or acute, quite entire; veinlets simple, the lower forked. Sori numerous, towards the margin; involucre cordate-reniform, glandular.—Hook. Sp. Fil. iv. 88; *Aspidium invisum*, Forst.?

**Northern** Island, *Forster*; Bay of Islands and east coast, *Colenso*. The var.  $\beta$  is a native also of South Africa; the typical plant, which wants the bullate scales, is common in the north temperate zone.

3. **N. velutinum**, *Hook. f.*—*Lastrea velutina*, Fl. N. Z. ii. 39. t. 80. Rhizome unknown. Frond rather membranous, deltoid or 5-angled, 1–2 ft. high and broad, acuminate, downy with silky hairs on both sides, often glandular beneath, 2- or 3-pinnate or 4-pinnate at the base, red-brown when dry; stipes long, slender, pubescent, clothed with subulate scales at the base; primary pinnæ, 4 in.—1 ft. long, broadly oblong, acuminate, long-stalked, lowest inferior secondary pinna deflexed, most compound; pinnules sessile, oblong, acute, pinnatifid, segments ovate, obtuse, serrate or crenate; veinlets simple or forked. Sori small, one on each segment; involucre hairy, red-brown, often fringed with glands, sometimes minute or absent.—*Aspidium velutinum*, A. Rich.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc.

4. **N. decompositum**, *Br.*;—Fl. N. Z. ii. 39. t. 79. Rhizome short, stout, creeping, black. Fronds as in *N. velutinum*, but very variable, often smaller, always green when dry, glabrous or pubescent, segments more acutely serrated, sometimes only pinnate, pinnules often elongate or caudate; stipes with fewer scales at the base.—Hook. Sp. Fil. iv. 146; *N. glabellum*, A. Cunn.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. **Kermadec** Islands, *Macgillivray*. Also found in Tasmania, Australia, Norfolk Island, and the Pacific islands.

5. **N. hispidum**, *Hook. Sp. Fil.* iv. 150.—*Polystichum hispidum*, J. Sm.; —Fl. N. Z. ii. 38. Rhizome long, stout, creeping, covered with subulate brown scales. Fronds 1–2 ft. high, rigid, ovate-acuminate, 3- or 4-pinnate, pubescent beneath; stipes stout, and rachis and costa hispid with long rigid spreading or deflexed bristles with a swollen base; primary pinnæ 3–6 in. long, stipitate, ovate, acuminate, lowest pair deltoid; pinnules decurrent, narrow lanceolate,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, deeply serrate, segments pungent; veinlets solitary in each segment. Sori solitary on the segments; involucre flat, orbicular or reniform, dark brown.—*Aspidium hispidum*, Seckuhr, Fil. t. 49; *Polypodium setosum*, Forst.

Throughout the **Northern** and **Middle** Islands: abundant, *Banks and Solander*, etc. I have followed the 'Species Filicum' in referring this to *Nephrodium*, but the involucre is more that of *Polystichum*.

*Aspidium Serra*, Forst. Nothing is known of this plant, which is probably the common tropical *Nephrodium propinquum*, Br., or *N. unitum*, Sieb., which Forster gathered in the South Sea Islands. Raoul enters it into his catalogue as having been collected at Akaroa by himself, probably confounding it with something else.

Mrs. Jones (Handbook of N. Z. Ficus) mentions another species of *Nephrodium* as having been found near to hot springs, which differs from *N. molle* in the pinnæ tending upwards, and the position of the sori.

## 21. NEPHROLEPIS, Schott.

Rhizome creeping or short or 0.—Fronds coriaceous, pinnate. Pinnæ jointed on the rachis, deciduous, with minute white waxy dots on the upper surface. Sori dorsal, on the tip of the upper branch of a vein. Involucre flat, cordate reniform or lunate, attached by a broad base.

A small tropical or subtropical genus.

1. *N. tuberosa*, Presl. Rhizome scarcely any; roots of long wiry fibres, bearing ovoid or oblong scaly tubers. Fronds tufted, 1–3 ft. long, linear-lanceolate, acuminate, pinnate; stipes stout and rachis with deciduous scales; pinnules numerous, close set, horizontal,  $\frac{1}{3}$ –1 in. long, oblong, obtuse, truncate cordate or obliquely auricled at the base, straight or falcate, lower shorter. Sori halfway between the costa and margin; involucre firm, reniform, brown, black towards the base.—Hook. Sp. Fil. iv. 151.

**Northern Island:** hot springs near Waikati, *Dr. Hochstetter and Sinclair*. A most abundant tropical fern, also found in the warmer parts of Australia. The tubers are eaten in India.

## 22. POLYPODIUM, Linn.

Rhizome erect or creeping or 0.—Fronds tufted or not, simple or compound. Venation various. Sori globose (sometimes oblong in *P. Grammitidis*). Involucre 0.

As above defined, this is the largest genus of ferns. It is broken up into many genera by most authors, but these are united by so many ambiguous species, that it is difficult to retain any of them. Many of the species are naturally referable to genera in which there is always an involucre; thus *P. rugulosum* passes into *Hypolepis tenuifolia*; *P. pennigerum* is a *Nephrodium*, without the involucre; and *P. sylvaticum* approaches *Aspidium aculeatum*, very closely, in habit and other respects.

I. Veins usually free. Sori rounded, linear or oblong, placed on the ends, rarely on the middle of the veinlets.

## a. Frond simply pinnate or pinnatifidly divided.

- |   |                            |
|---|----------------------------|
| Rhizome short, creeping, scaly. Frond quite entire. Sori oblong or linear . . . . . | 1. <i>P. australe</i> .    |
| Rhizome very short, scaly. Frond pinnatifid. Sori round or oblong . . . . .         | 2. <i>P. Grammitidis</i> . |
| Rhizome long, slender, climbing. Fronds pendulous, pinnate, glabrous . . . . .      | 3. <i>P. tenellum</i> .    |

## β. Frond 2–4-pinnate.

- |   |                           |
|---|---------------------------|
| Rhizome short, stout, erect. Fronds tufted, erect, lanceolate; pinnules spinulose . . . . . | 4. <i>P. sylvaticum</i> . |
| Rhizome long, stout, creeping. Frond deltoid, glandular; pinnules obtuse . . . . .          | 5. <i>P. rugulosum</i> .  |

II. Veins all free except those next the margin, which meet or almost meet (*Goniopteris*).

- |   |                           |
|---|---------------------------|
| Rhizome stout, erect. Frond pinnate, membranous, glabrous . . . . . | 6. <i>P. pennigerum</i> . |
|---|---------------------------|

III. Veins anastomosing, hidden in the frond which is densely covered with stellate hairs (*Niphobolus*).

- |   |                         |
|---|-------------------------|
| Rhizome creeping, scaly. Frond entire . . . . . | 7. <i>P. rupestre</i> . |
|---|-------------------------|

IV. Veins anastomosing, with free veinlets in the areoles. Fronds glabrous (*Phymatodes*).

- |  |                             |
|--|-----------------------------|
| Rhizome very short. Fronds tufted, lanceolate, acuminate, quite entire . . . . . | 8. <i>P. Cunninghamsi</i> . |
|--|-----------------------------|

Rhizome slender, scandent, squarrose with scales. Frond simple or pinnatifid . . . . . 9. *P. pustulatum*.  
 Rhizome stout, glaucous, creeping or scandent, scales appressed. Frond simple or pinnatifid . . . . . 10. *P. Billiardieri*.

1. **P. australe**, *Mettenius*.—*Grammitis australis*, Fl. N. Z. ii. 44. Rhizome short, creeping, scaly. Fronds densely tufted,  $\frac{1}{4}$  in.—1 ft. high, coriaceous, simple, linear- or obovate-lanceolate, acute or obtuse, glabrous pubescent pilose or ciliate, quite entire, narrowed into a winged stipes. Sori oblong or (being confluent) linear, in 1 series on each side of the obscure midrib.—Hook. Sp. Fil. iv. 167; *Grammitis Billiardieri*, Willd.; *G. ciliata*, Colenso; *G. australis*, *rigida*, and *humilis*, Homb. and Jacq. Voy. au Pôle Sud, t. 2. f. F. G. H.

On trees, rocks, etc., throughout the **Northern** and **Middle** Islands: abundant, *Banks and Solander*, etc., ascending the mountains to 5000 ft. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* Equally abundant in Australia, Tasmania, Chili, Fuegia, and Tristan d'Acunha.

2. **P. Grammitidis**, *Br.*—*Fl. N. Z.* ii. 41. Rhizome very short, scaly, roots fibrous. Fronds densely tufted, 1–10 (rarely 15) in. long, coriaceous, glabrous, linear-oblong ovate or lanceolate, deeply pinnatifid, or almost pinnate, narrowed below into a short winged stipes, which is scaly at the base; segments or pinnules distant, linear, obtuse, quite decurrent, entire lobed or pinnatifid; segments sometimes caudate. Sori round or oblong.—Hook. Sp. Fil. iv. 230; *Grammitis heterophylla*, Labill. Fl. Nov. Holl. t. 239.

On trunks of trees, etc., throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* Also found in Australia.

3. **P. tenellum**, *Forst.*;—*Arthropteris tenella*, J. Sm. in Fl. N. Z. ii. 43. t. 82. Rhizome scandent, long, slender, rigid, wiry, scaly. Fronds scattered, pendulous, 1–2 ft. long, lanceolate, pinnate, rather membranous, bright-green; stipes slender, smooth and polished, jointed above the base; pinnules alternate, distant, 2–3 in. long, jointed on the rachis, linear-lanceolate, attenuated with an obtuse tip, sometimes forked, obliquely cuneate at the base; margin sinuate; costa slender; veins oblique, once or twice forked; veinlets with thickened tips. Sori globose, in 1 series on each side the costa, on the tip of a veinlet near the margin.—Hook. Sp. Fil. iv. 217; Schkuhr, Fil. t. 16; *A. (?) filipes*, Moore, of J. Sm. in Gard. Chron.

**Northern** Island: climbing lofty trees, abundant, *Banks and Solander*, etc. Also a native of New South Wales, Lord Howe's, Norfolk Island and other Pacific Islands.

4. **P. sylvaticum**, *Colenso*;—*Fl. N. Z.* ii. 41. t. 81. Rhizome stout, erect. Frond tufted, rather coriaceous, 1–2 ft. long, lanceolate, acuminate, 2-pinnate, glabrous, except on the costa; stipes stout, and rachis villous with deciduous subulate soft ferruginous scales mixed with rigid black curved ones; primary divisions distant, stalked, 2–4 in. long, oblong, acuminate; pinnules  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, sessile, ovate-lanceolate, with an obliquely cuneate base, pinnatifid; lobes spinulose, subincurved; veins once or twice forked. Sori globose, equidistant between the costa and margin.—Hook. Sp. Fil. iv. 249.

**Northern** Island: Ruahine and other ranges, *Colenso*; Port Nicholson, *Lyall*. **Middle**



Island: not uncommon as far south as Otago. Very similar indeed to *Aspidium aculeatum*, and with similar scales, but the pinnules are more stipitate, longer, and narrower.

5. **P. rugulosum**, Labill. *Fl. Nov. Holl. t.* 241;—*Fl. N. Z.* ii. 41. Rhizome stout, creeping, rigid, villous or hispid and scaly. Fronds scattered,  $\frac{1}{2}$ –3 ft. high, rather membranous, covered with glandular viscid pubescence, often rufous when dry, ovate-lanceolate or deltoid, 2–4-pinnate; stipes and rachis bright red-brown, glandular pubescent and tubercled; primary divisions in distant stipitate pairs, oblong, acuminate; pinnules  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, oblong or linear-oblong, obtuse, pinnatifid with rounded lobes or angled at the margin; veins once or twice forked. Sori on the veinlets, sometimes very abundant and covering the under surface of the pinnæ.—Hook. *Sp. Fil.* iv. 272; *P. viscidum*, Sprengel; *Cheilanthes ambigua*, A. Rich.

Abundant in woods throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. **Lord Auckland's** group and **Campbell's** Island, *J. D. II.* A very common tropical and southern temperate fern, in all quarters of the globe, passing into *Hypolepis tenuifolia*.

6. **P. pennigerum**, Forst.;—*Goniopteris pennigera*, J. Sm.; *Fl. N. Z.* ii. 40. Rhizome erect, 6–12 in. high, stout, woody, covered with the bases of the old stipes. Fronds 2–3 ft. high, glabrous, oblong, lanceolate, membranous, pinnate, pinnatifid at the top; stipes and rachis stout, quite glabrous and smooth, scaly at the very base; pinnules often opposite, sessile, truncate or auricled at the base, linear-elongate, 4–8 in. long,  $\frac{2}{3}$  in. broad, long acuminate or caudate, pinnatifid to the middle, lobes short, ovate, obtuse, quite entire; veins 6–8 pairs, free except the lowest branch, which meets the next above it at the sinus between the lobes. Sori globose, numerous, on the middle of the veins, nearer the costa than the margin.—Hook. *Sp. Fil.* v. 7; Schkuhr, *Fil.* t. 22; *Aspidium pennigerum*, Swartz.

Abundant throughout the **Northern** and **Middle** Islands to Akaroa (*Raoul*), *Banks and Solander*, etc. I have seen no Otago specimens; nor is the plant found in the Kermadec Islands or Norfolk Island.

7. **P. rupestre**, Br.;—*Niphobolus rupestris*, Hook. and Grev.  *Ic. Fil.* t. 93; *Fl. N. Z.* ii. 44. Rhizome slender, creeping, tortuous, scaly, branched, scales narrow. Fronds distant, erect, of 2 forms, simple, tapering into a short stipes which is jointed on to the rhizome, very coriaceous, covered with rusty-brown or white stellate hairs and down; barren fronds 1–4 in. long,  $\frac{1}{2}$ –1 in. broad, obovate spatulate or orbicular, obtuse; fertile 3–6 in. long, linear or linear-oblong or lanceolate; veins irregularly anastomosing, sunk in the substance of the frond. Sori large, numerous, protruding through the tomentum, often confluent, irregularly placed, but chiefly on the upper half of the frond.—Hook. *Sp. Fil.* v. 46; *P. stellatum*, A. Rich.; *P. serpens*, Forst.; *P. elæagnifolium*, Bory.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. **Kermadec** Islands, *Macgillivray*. Also a native of Australia and the Pacific Islands. The stellate hairs of this plant, horizontally placed on a jointed stalk, are beautiful microscopic objects.

8. **P. Cunninghami**, Hook. *Sp. Fil.* v. 58.—*Dictymia lanceolata*, J. Sm.; *Fl. N. Z.* ii. 43. Rhizome very short, covered with broad imbricating

scales, and woolly roots. Frond glabrous, tufted, 2-12 in. long,  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad, lanceolate, acuminate, quite entire, tapering into a short margined stipes, which is not jointed on to the rhizome; costa distinct; veins sunk in the substance of the frond, anastomosing, free veinlets 0. Sori large, sunk in pits of the frond, globose or oval, in 1 series on each side of and near the costa. Capsules mixed with jointed hairs, on long pedicels.—Hook. Sp. Fil. v. 58; *P. attenuatum*, A. Rich., not Brown; Hook. Ic. Pl. t. 409.

**Northern and Middle Islands:** on trunks of trees and rocks, as far south as Akaroa, Banks and Solander, etc. Also found in the New Hebrides, but not in Australia, where the *P. attenuatum*, with which this was long confounded, takes its place.

9. ***P. pustulatum*, Forst.**;—*Phymatodes pustulata*, Presl; Fl. N. Z. ii. 42. Rhizome long, branched, slender, creeping, squarrose with subulate scales. Fronds distant, stipitate, numerous, pendulous, rather membranous, flaccid, 6-18 in. long, 1-6 in. wide, tapering into a slender glabrous stipes, lanceolate or oblong, acuminate, entire or pinnatifid to the rachis; segments distant, 2-3 in. long,  $\frac{1}{2}$ -1 wide, tapering from a broad base to an obtusely acuminate point; venation lax, anastomosing, with free included veinlets. Sori oval or globose, prominent, scarcely sunk in the frond, forming a series parallel with the margin and near it.—Hook. Sp. Fil. v. 80; Schkuhr, Fil. t. 10; *P. membranifolium*, Br.; *P. scandens*, Forst.

Abundant throughout the **Northern and Middle Islands**, Banks and Solander, etc. Climbing lofty trees. Plant very fragrant; also found in Norfolk Island and Australia.

10. ***P. Billardieri*, Br.**;—*Phymatodes Billardieri*, Presl;—Fl. N. Z. ii. 42. Rhizome stout, creeping, usually glaucous, more or less covered with appressed scales. Fronds numerous, polymorphous, erect or pendulous, distant, coriaceous, perfectly smooth and glabrous; narrowed into a stout smooth stipes, which is jointed on to the rhizome, 3-18 in. long, lanceolate or oblong, obtuse or acute, entire and acuminate or broader and pinnatifid; margin thickened; pinnules broad or narrow-oblong, remote or distant, obtuse or acute; costa stout, prominent; veins anastomosing, with a few free veinlets in the areoles. Sori partially sunk in the frond, numerous, large, globose or oblong, in one series on each side of the costa.—Hook. Sp. Fil. v. 82; *P. scandens*, Labill. Fl. Nov. Holl. t. 240, not Forst.; *Niphobolus glaber*, Kaulf. of A. Rich. Flora(?).

Abundant throughout the **Northern and Middle Islands**, Banks and Solander, etc. **Kermadec Islands**, Macgillivray. **Lord Auckland's** group and **Campbell's** Island, J. D. H. Also abundant in Australia, Tasmania, and the Pacific Islands.

## 23. GYMNOGRAMME, Desvaux.

Ferns of various habit; the New Zealand species are small and tufted.—Fronds pinnate or 2- or 3-pinnate. Veins free or anastomosing. Sori oblong or linear, usually spreading in branching lines over the under surface of the pinnæ, either on the veins or between them. Involucre 0.

A large genus of temperate and tropical ferns, chiefly distinguished from *Polypodium* by the more linear sori, which often branch.

Glabrous, annual, very membranous, 2- or 3-pinnatifid . . . . . 1. *G. leptophylla*.  
Villous and glandular, perennial, pinnate . . . . . 2. *G. rutæfolia*.

1. **G. leptophylla**, *Desvaux*;—*Fl. N. Z.* ii. 45. Annual; roots fibrous; fronds tufted, 1–8 in. high, perfectly glabrous, flaccid, membranous, pale green, shining, oblong-lanceolate, 2- or 3-pinnatifid; outer barren, smaller than the inner which are more fertile; stipes slender, brittle; pinnules small, obovate-cuneate, 2- or 3-fid or lobed, lobes obtuse, decurrent; veins dichotomous. Sori simple or confluent, oblong.—*Hook. Sp. Fil.* v. 136; *Hook. and Grev. Ic. Fil.* t. 25; *Grammitis novæ-Zelandiæ*, *Colenso*.

**Northern Island**: hills on the east coast, *Colenso*, *Sinclair*; summit of Mount Wellington (*Mrs. Jones*). A very widely diffused fern, found in various parts of all the continents and in many of the oceanic islands.

2. **G. rutæfolia**, *Br.*;—*Fl. N. Z.* ii. 45. Rhizome very short, stout, ascending, perennial. Fronds tufted, 1–3 in. high, densely glandular and villous, rather membranous, linear-oblong, obtuse, pinnate; stipes brittle, rather slender; pinnules alternate, rather distant,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, obovate or obliquely rhomboid or flabellate, cuneate at the base, and tapering into a short petiole, variously lobed or pinnatifid, segments cuneate; veins flabellate, dichotomous. Sori oblong or linear, simple or forked.—*Hook. Sp. Fil.* v. 137; *Fil. Exot.* t. 5.

**Northern Island**: Cook's Straits, on cliffs, very rare, *Colenso*. A very common Australian and Tasmanian plant, also found in the Pyrenees and in Bourbon, but hitherto in no other countries.

**G. involuta**, *Don* (*Grammitis scolopendrina*, *Bory*), is stated by *Bory* to be a native of New Zealand, but erroneously; in the Flora of New Zealand I had supposed it to be the same with *Polypodium australe* (*G. australis*).

## 24. NOTHOCHLÆNA, Br.

Rhizome short, or long and creeping, scaly.—Fronds 2- or 3-pinnate, usually small, stiff, erect. Pinnæ small. Sori marginal, rounded, oblong or linear, confluent, often partially covered by the recurved margin of the frond, veins simple or forked. Involucre 0.

A considerable genus of tropical and temperate ferns, very closely resembling *Cheilanthes*, but with no true involucre.

1. **N. distans**, *Br.*;—*Fl. N. Z.* ii. 45. Rhizome very short, stout, suberect or prostrate, scaly; roots matted. Fronds tufted, erect, rigid, 4–10 in. high, coriaceous, covered with subulate, ferruginous, piliferous scales below, hirsute above, linear-oblong, obtuse, 2-pinnate; stipes stout, dark red-brown, shining; primary divisions stipitate, opposite,  $\frac{1}{2}$ –1 in. long, erecto-patent, deltoid, ovate, the lower distant; pinnules in few pairs, ovate-oblong, obtuse, lower pinnatifid at the base, margins recurved. Sori continuous.—*Hook. Sp. Fil.* vi. 114, *Ic. Pl.* t. 980; *Labill. Sert. Nov. Caled.* t. 8.

**Northern Island**: common on basaltic rocks, *Colenso*, etc. A native of Australia, Tasmania, and New Caledonia.

## 25. TODEA, Willdenow.

Rhizome very stout, erect.—Fronds tufted at the top of the rhizome, large, 2-pinnate, very coriaceous. Veins simple or forked. Sori on the under-

surface of the lower pinnæ of each branch of the frond, inserted on the veins, large, subglobose. Capsules large, shortly stipitate, subglobose, vertically 2-valved, with a short transverse, lateral or subterminal, transversely striate areola. Spores oblong, with a dark nucleus. Involucre 0.

The following is the only species, but the genus should perhaps be united with *Osmunda*; it differs from *Leptopteris* in the coriaceous fronds.

1. **T. africana**, *Willdenow*. Fronds 4–8 ft. high, very coriaceous, 2-pinnate; quite glabrous, oblong-lanceolate; stipes and rachis very stout, pale brown, quite smooth and glabrous; primary branches linear, a span and more long; pinnules alternate on the branches, narrow, linear-oblong or lanceolate, acute or acuminate, crenate or serrate,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. long, sessile by a broad, often decurrent base.—*Fl. Tasman.* t. 168.

**Northern** Island: Mount Carmel, *Jolliffe*; Hokianga (*Mrs. Jones*). Also a native of Australia, Tasmania, and South Africa.

## 26. LEPTOPTERIS, Presl.

Fronds erect, membranous, pellucid, deep green, 2- or 3-pinnate. Capsules scarcely collected into sori, scattered over the under-surface of the pinnæ, upon the veinlets, pedicelled, subglobose, gibbous, the gibbous part with a small transversely striate areola. Spores depressed, with a dark spot.

A small genus of Australian and New Zealand ferns, as transparent as *Hymenophyllum*, and differing in this respect only from *Todea*.

Frond truncate below, the lowest pinnæ long . . . . . 1. *L. hymenophylloides*.  
Frond narrowed below, the lower pinnæ becoming gradually smaller 2. *L. superba*.

1. **L. hymenophylloides**, *Presl*;—*Fl. N. Z.* ii. 48. Rhizome short, stout, creeping. Fronds 6 in.–3 ft. high, ovate-lanceolate or deltoid, 2-pinnate; stipes slender or stout, and rachis glabrate, or covered with rather woolly red-brown tomentum; primary divisions spreading, linear-lanceolate, acuminate, stalked, the lower not becoming gradually very small; pinnules numerous, crowded, shortly stipitate, oblong, obtuse, deeply pinnatifid, segments narrow, generally forked.—*Todea hymenophylloides*, *Presl*;—*A. Rich. Flor.* t. 16; *Hook. Garden Ferns*, t. 54; *T. pellucida*, *Hook. Ic. Pl.* t. 8.

Abundant throughout the **Northern** and **Middle** Islands, *Banks* and *Solander*, etc. Closely allied to the New South Wales *L. pellucida*.

2. **L. superba**, *Hook. Ic. Pl.* t. 910; *Fl. N. Z.* ii. 48. Fronds forming a crown on the top of the rhizome, lanceolate, narrowed at the base, by the pinnæ gradually becoming very small, and often produced to the very rhizome, stout, erect, 2–3 ft. high; stipes and rachis very stout, woolly; primary pinnæ more numerous and close together than in *L. hymenophylloides*, not stipitate, the basal pinnules often overlapping the primary rachis; pinnules excessively numerous, densely crowded, ovate, often crisped, and concealing the rachis.—*Todea superba*, *Colenso*.

Forests of the mountainous parts of the **Northern** Island, *Colenso*; more common in the **Middle** Island, *Banks* and *Solander*, *Forster*, etc. **Lord Auckland's** group, *Bolton*. A most splendid fern, but I suspect that it passes into the preceding.



27. **LYGODIUM**, Swartz.

Rhizome creeping.—Stipes climbing, very long, branched, slender, tough, like whipcord. Frond dichotomously branched; veins forked, free in the New Zealand species; barren pinnæ linear-oblong, fertile flabellately divided or similar to the barren. Sori distichous, forming short spikelets projecting from the frond. Involucres imbricating, distichous, each containing one ovoid capsule. Capsule attached by its side, pointing downwards and inwards, reticulated, the top with radiating striæ. Spores obtusely 3-angled.

A very common tropical genus, of which the New Zealand species is found in no other part of the world except Norfolk Island.

1. **L. articulatum**, *A. Rich. Flor. t. 15*;—*Fl. N. Z. ii. 47*. Perfectly glabrous. Rhizome slender, covered with brown, slender scales. Stipes very numerous, angular, 50–100 ft. long, forming pendulous matted screens in the forests, jointed here and there. Fronds dichotomously palmatipartite, very much branched; barren pinnules stalked, divaricating, jointed on the rachis, 1–4 in. long, linear or oblong, obtuse or acute, cuneate at the base, often glaucous below; costa slender; fertile pinnules small, lobed, cuneate or fan-shaped, lobed; lobes small, short, with adnate spikelets towards their tips.

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc.

28. **SCHIZÆA**, Smith.

Rhizome short, creeping.—Stipes rigid, erect, flat or nearly terete. Frond simple forked or flabellate; segments terminated by a short pinnatifid fruiting comb-like limb, the incurved divisions of which are covered with imbricating capsules. Capsules in 2 parallel series, sessile, naked or partially covered by the incurved margins of the divisions, ovoid, reticulated, the top with radiating striæ, bursting laterally. Spores obtusely 3-angular.

A common tropical genus, rare in the northern temperate zone, more common in the southern.

Frond flattened, flabellately divided above . . . . . 1. *S. dichotoma*.  
Frond terete or semiterete, simple or forked . . . . . 2. *S. bifida*.

1. **S. dichotoma**, *Swartz*;—*Fl. N. Z. ii. 47*. Frond 6–24 in. high; stipes flat or compressed below, above suddenly expanding into a fan-shaped limb, of numerous narrow flat segments, each about 2 in. long and  $\frac{1}{12}$ – $\frac{1}{10}$  in. broad. Fruiting limb broad, short,  $\frac{1}{4}$  in. long, of 4–10 pairs of pinnules of equal length, with lacinate or fimbriate margins.—*Hook. and Grev. Ic. Fil. t. 17*.

**Northern** Island: in marshy places, Bay of Islands, *Cunningham*; Manakau Bay, *Colenso*. A common East Indian, Australian, Pacific Island, and African plant.

2. **S. bifida**, *Swartz*;—*Fl. N. Z. ii. 47*. Fronds crowded, erect, 6–18 in. high, rigid, wiry, semiterete, grooved down one side, simple or forked, smooth or slightly rough to the touch. Fruiting limb short, broad,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, of 8–10 pairs of pinnules, with crinite margins.—*S. propinqua*, *A. Cunn.*

Var. *β. australis*. Frond 1-3 in. high.—*S. australis*, Gaudichaud; *S. pectinata*, Homb. and Jacq., Voy. au Pôle Sud, Bot. t. 4 Z.

**Northern Island**: common in wet clayey places. **Middle Island**: probably common, but overlooked; Otago, *Hector and Buchanan*. **Lord Auckland's** group, *Hombroon and Jacquemont*, *J. D. H., Bolton*.

## 29. MARATTIA, Smith.

Rhizome large, tuberous, very thick.—Fronde numerous, very large and long, 2- or 3-pinnate; stipes very stout, jointed on to the rhizome, with adnate stipules at its base. Sori on the under surface of the pinnules, near the margin, terminating the veins; each sorus consists of 2 parallel oblong bodies (formed of connate coriaceous capsules), with plane opposite faces and convex backs, the faces marked with transverse slits leading to cavities containing the spores. Spores elliptical, very minute. A narrow fimbriate involucre fringes the sorus.

A tropical genus of few, very variable species.

1. *M. salicina*, *Smith*;—*Fl. N. Z.* ii. 49. Fronds 6-10 ft. high, coriaceous, dark green, deltoid, 2- or 3-pinnate; stipes very stout, green; pinnules sessile or stalked, jointed on to the rachis, 3-7 in. long, lanceolate or linear-oblong, acuminate, rounded at the base, serrate; costa stout, glabrous or hairy; veins parallel, free, simple or forked. Sori brown,  $\frac{1}{8}$  in. long.

Forests in the northern and eastern parts of the **Northern Island**, *Cunningham*, etc.; Taranaki (*Mrs. Jones*). The same species is found in Australia, India, South Africa, South America, and the Pacific Islands.

*Angiopteris evecta*, *Hoffm.*, a tropical plant allied to *Marattia*, has been stated, on insufficient authority, to be a native of New Zealand.

## 30. OPHIOGLOSSUM, Linn.

Root of fleshy fibres.—Stipes solitary, erect, bearing about the middle one oblong, erect, leaf-like frond, with reticulated venation, and terminated by a linear flattened spike of fructification. Spike consisting of 2 opposite rows of 6-30 globose, connate, coriaceous capsules, each bursting transversely. Spores very minute, rounded and 3-gonous.

A genus of but few species, found in all parts of the world, usually in grassy pastures.

1. *O. vulgatum*, *Linn.*;—*Fl. N. Z.* ii. 50. Quite glabrous, 1 in.-1 ft. high. Frond  $\frac{1}{4}$ -3 in. long, very variable in length, breadth, and texture.

Var. *β. costatum*. Frond ovate or lanceolate, with usually a distinct costa and evident veins.—*O. costatum*, *Br.*; *O. elongatum*, *A. Cunn.*

Var. *γ. gramineum*. Frond ovate or lanceolate, acute; costa 0; veins indistinct.—*O. gramineum*, *Willdenow*.

Var. *δ. lusitanicum*. Frond linear-lanceolate or linear-oblong; costa 0; veins indistinct.—*O. lusitanum*, *Willdenow*; *O. coriaceum*, *A. Cunn.*

Var. *ε. minimum*. Small, 1-2 in. high. Frond rhomboid- or oblong-ovate, acute.

Common in grassy places throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. A native of England and most temperate parts of the world.

## 31. BOTRYCHIUM, Linn.

Root of thick fleshy fibres.—Stipes erect, bearing 1 pinnate or much-

divided frond, and a branched spike or panicle of fructification. Capsules globose, distichously arranged on the branches, separate from one another, bursting transversely. Spores very minute, 3-lobed.

A small genus, found in most temperate and warm regions of the globe, but rare in very hot ones.

1. **B. cicutarium**, Swartz. Stout, rarely slender, 3-18 in. high, glabrous or slightly pilose. Frond broadly ovate or deltoid, 2- or 3-pinnatifid or 3-nately decompound; pinnæ variable in shape, oblong, obtuse, crenate, obscurely veined; peduncle of the fruiting panicle radical or nearly so, 2-pinnately branched above.

Var.  $\alpha$ . Frond stout, fleshy.—*B. virginicum*, Fl. N. Z. ii. 50, not Linn.; Fl. Tasman. ii. t. 169 B; *B. australe*, Br.; *B. lunarioides*, Swartz.

Var.  $\beta$ . *dissectum*. Frond slender, much more finely divided.—*B. dissectum*, Muhlenberg; *B. lunarioides*, var. *dissectum*, A. Gray.

**Northern and Middle Islands**: var.  $\alpha$ , abundant, *Banks and Solander*, etc.; var.  $\beta$ , Whangarei, near Auckland, *G. Burnett, Esq.* The var.  $\alpha$  is a common plant in many parts of the globe, temperate and tropical, including Australia and Tasmania. Var.  $\beta$  is also frequent in North America and in some parts of Asia and Europe, but seems to be very scarce in New Zealand: it looks remarkably different, but is united by intermediate forms in the northern hemisphere. Its discoverer in New Zealand observes that var.  $\alpha$  is abundant in the same neighbourhood where var.  $\beta$  itself is so scarce.

## ORDER II. LYCOPODIACEÆ.

Erect or prostrate or creeping, rarely climbing, simple or branched plants, with usually rigid stems. Stems and ribs of the leaves with bundles of vascular tissue, consisting of wood-fibres and spirally-marked and barred vessels.—Leaves imbricated all round the stem or distichous or 4-fariously arranged, small, usually coriaceous, subulate, and nerveless, sometimes flattened and 1-nerved, sometimes of 2 forms, the larger distichous, smaller stipule-like. Capsules sessile in the axils of the leaves or of the scales of terminal sessile or peduncled, cylindric or 4-gonous cones, 2- or 3-valved, 1-3-celled, of two kinds: 1st, compressed, often reniform, coriaceous capsules, 2-valved, full of microscopic, obtusely 3-gonous spores; 2nd, larger capsules, containing 3 or 4 much larger spores, each marked with 3 radiating lines at the top.

Germination has been observed in the large spores of the genus *Selaginella* only, which does not occur in New Zealand. In this genus the contents of the large spore develop a small cellular expansion within its coat, under the position of the three radiating lines; upon this (the pro-embryo or prothallium) cellular papillæ (archegonia) appear, each containing an open cavity, at the base of which is a free cell, from which the future plant is afterwards developed. The cellular papillæ are produced in abundance on the prothallium along three radiating lines corresponding to those on the coat of the spore, but only one gives origin to a young plant. The small spores of *Selaginella* produce antheridia, which are cells containing a spiral thread endowed with motion (spermatozoa); these no doubt gain access to the papillæ on the prothallium, but no one has proved this to be so. Nothing is known of the process of fertilization or reproduction in any of the New Zealand genera, to which the attention of the student should be directed.

*Lycopodiaceæ* are found in all situations and all quarters of the globe except the driest; the New Zealand species are the largest of the Order, and present nearer affinities to the fossil *Lycopodiaceæ* of the Coal period than any other existing plants.

Leaves linear, radical. Cone borne on a solitary radical peduncle . . . . .	1. PHYLLOGLOSSUM.
Stems leafy, branched. Leaves small. Capsules 1-celled, in the upper leaf-axils or in cones . . . . .	2. LYCOPodium.
Stems leafy, simple. Leaves large. Capsule on the leaf base, 2-celled . . . . .	3. TMESIPTERIS.
Stem leafless, branched, 3-gonous. Capsules lateral on the branches, 3-celled. . . . .	4. PSILOTUM.

### 1. PHYLLOGLOSSUM, Kunze.

Root of 2 ovoid tubers, with long fleshy fibres from the crown.—Leaves all radical, 6–10, terete, subulate. Scape simple, erect, terete, terminated by a terete or ovoid spike of imbricating, 3-gonous, pedicelled scales. Capsules solitary in the axils of the scales, 1-celled, 2-valved. Spores most minute, obtusely tetrahedral, with 3 radiating lines at the top.

A remarkable little plant, with the habit of *Ophioglossum*. Also found in Australia and Tasmania.

1. **P. Drummondii**, Kunze;—*Fl. N. Z.* ii. 51. Green, quite glabrous, 1–3 in. high. Leaves  $\frac{1}{2}$  in. long. Scales of spike sub-3-angular, suddenly contracted upwards into an obtuse beak, and downwards into a short rounded auricle.—Hook. Ic. Pl. t. 908.

**Northern** Island: in grassy places, clay banks, etc., Bay of Islands, Auckland, etc., *Sinclair*, *Colenso*, etc.

### 2. LYCOPodium, Linn.

Rhizome tufted or creeping.—Stems erect or pendulous, simple or branched, covered with distichous 4-ranked or imbricating, small leaves. Capsules solitary in the axils of the upper stem-leaves, or in the scales of slender terminal spikes, coriaceous, usually reniform, 1-celled, bursting transversely into 2 valves, full of excessively minute 3-gonous or tetrahedral spores.

An immense genus, found in all parts of the world, and in all climates but the very dry.

I. *Leaves imbricated all round the stem. Capsules axillary in the upper leaves, or in the scales of sessile, terminal, 4-gonous spikes.*

Stems 4–8 in., tufted, erect, stout. Leaves all similar, broad, subulate, the upper with capsules . . . . .	1. <i>L. Selago</i> .
Stems 6–18 in., stout, curving, erect. Leaves linear, decurrent, obtuse. Capsules in terminal drooping spikes . . . . .	2. <i>L. varium</i> .
Stems 2–4 ft., slender, pendulous. Leaves linear. Capsules in long, branched, pendulous spikes . . . . .	3. <i>L. Billardieri</i> .

II. *Leaves imbricated all round the stem. Spikes sessile, cylindrical.*

Stems stout, erect, densely branched. Leaves very variable, subulate. Spikes terminal; scales squarrose . . . . .	4. <i>L. densum</i> .
Stems slender, erect, rarely branched. Spikes lateral; scales erect . . . . .	5. <i>L. laterale</i> .
Stems stout, creeping; branches erect, fastigiate; tips incurved. Spikes short; scales toothed . . . . .	6. <i>L. cernuum</i> .

III. *Leaves imbricated all round the stem. Spikes terete, peduncled.*

Stems creeping. Peduncles lateral, long. Scales of spike with spreading points . . . . .	7. <i>L. carolinianum</i> .
Stems creeping, with erect fastigiate branches. Peduncles terminal. Scales of spike recurved . . . . .	8. <i>L. clavatum</i> .



IV. *Leaves distichous. Spikes terminal, terete.*

Stems creeping, 1-2 ft. Spikes solitary or 2-nate . . . . . 9. *L. scariosum*.  
Stems climbing, 2-10 ft. Spikes in branched panicles . . . . . 10. *L. volubile*.

1. **L. Selago**, *Linn.*;—*Fl. N. Z.* ii. 52. Rhizome stout, creeping. Stems 4-8 in. high, stout, cylindric, obtuse,  $\frac{1}{4}$ - $\frac{1}{3}$  in. diam. Leaves densely imbricated, green or reddish,  $\frac{1}{8}$ - $\frac{1}{3}$  in. long, usually erect or incurved, rarely squarrose or spreading, subulate-lanceolate, acute or acuminate, quite entire or obscurely serrate. Capsules all axillary in the upper leaves.

**Middle Island**: Nelson mountains, *Bidwill*; Southern Alps, *Haast*; Otago, lake district, *Hector*. A very common alpine and arctic plant, found in most cool mountainous damp regions of the globe.

2. **L. varium**, *Br.*;—*Fl. N. Z.* i. 52. Rhizome short or 0. Stems tufted, stout, erect or pendulous from trees, 6-18 in. high, simple or branched. Leaves closely imbricated all round the stem,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, erect or spreading, linear, obtuse, decurrent, quite entire, dark green; midrib obscure. Spikes terminal, sessile, 4-gonous, simple or branched, usually drooping; scales short, ovate, keeled, obtuse, sometimes foliaceous.—*Hook. and Grev. Ic. Fil.* t. 112.—*L. sulcinervium*, *Spring*.

**Northern and Middle Island**: mountainous districts, abundant, *Dieffenbach*, *Colenso*, etc. **Lord Auckland's** and **Campbell's** Islands, *J. D. H.* A common Tasmanian plant, which, I suspect, passes into *L. Selago* on one hand and *L. Billardieri* on the other; it is scarcely distinguishable from a South African species.

3. **L. Billardieri**, *Spring.*;—*Fl. N. Z.* ii. 53. Rhizome short. Stems tufted, pendulous from trees, 2-4 ft. long, slender, rigid, cylindric, grooved, flexuous, branched. Leaves  $\frac{1}{4}$ - $\frac{3}{4}$  in. long, scattered below, above close-set, imbricating all round, decurrent, linear-oblong or ligulate, obtuse or acute, the lower with sometimes an evident midrib. Spikes slender, flaccid, several inches long, dichotomously branched, 4-gonous; scales 4-fariously imbricate, broadly ovate, obtuse, keeled, often smaller than the capsules.—*L. flagellaria*, *A. Rich.*, not of *Bory*; *L. Phlegmaria*, *A. Cunn.*, not of *Linn.*

Abundant throughout the **Northern and Middle Islands**, *Banks and Solander*, etc. This almost passes into various tropical forms, but is not exactly similar to any.

4. **L. densum**, *Labill. Fl. Nov. Holl.* t. 251;—*Fl. N. Z.* ii. 53. Rhizome stout, creeping. Stems tall, erect, woody, rigid, 1-3 ft. high, densely fastigiately branched; branches erect or patent. Leaves imbricated all round, subulate, acuminate or piliferous,  $\frac{1}{16}$ - $\frac{1}{8}$  in. long, appressed spreading or squarrose, sometimes 6-fariously imbricated. Spikes terminal, solitary, sessile,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, cylindric, obtuse; scales scarious, spreading or squarrose, peltate, 3-angular, jagged. Spores hispid.

**Northern Island**: abundant, *Banks and Solander*, etc. **Chatham Island**, *Dieffenbach*. Also a native of Norfolk Island, Tasmania, Australia, and New Ireland.

5. **L. laterale**, *Br.*;—*Fl. N. Z.* ii. 53. Rhizome slender, creeping. Stems ascending or erect, 3-10 in. high, simple or divided, obtuse. Leaves imbricating all round, spreading and squarrose,  $\frac{1}{2}$  in. long, narrow-subulate. Spikes solitary, axillary, sessile, erect,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, terete, obtuse; scales 4-farious, coriaceous, broadly ovate or rounded, suddenly contracted to a stiff erect point; margins scarious, jagged.—*Labill. Sert. Nov. Calcd.* t. 15.

**Northern and Middle Islands**: not rare in wet places, amongst grass, etc. A native of Australia, Tasmania, and New Caledonia.

6. ***L. cernuum***, *Linn.*;—*Fl. N. Z.* ii. 54. Stem stout, creeping, 2–3 ft. long, leafy, with erect, stiff, much divided branches 6–12 in. high. Leaves numerous, spreading, squarrose or incurved,  $\frac{1}{8}$  in. long, acerose or subulate, keeled, inserted all round the stem and branches, quite entire. Spikes short, terminal, sessile on short incurved branchlets, cylindric; scales imbricated all round, ovate or ovate-lanceolate, with long serrate acuminate points, margins scarious and ciliate.

Northern parts of the **Northern Island**: Bay of Islands, *Cunningham*, etc. A most abundant plant in all hot and subtropical climates.

7. ***L. carolinianum***, *Linn.*;—*Fl. N. Z.* ii. 54. Stem creeping and rooting, 2–6 in. long; branches few, also creeping, never erect or ascending. Leaves imbricated all round, curved, subulate,  $\frac{1}{3}$ – $\frac{1}{4}$  in. long. Spike 1–2 in. long, cylindric, on an erect lateral stiff peduncle which is 1–4 in. high and covered with erect subulate leaves. Scales peltate, in about 6 rows, stiff, broadly ovate below, with rigid spreading points, and scarious toothed rarely entire margins.

**Northern Island**: Bay of Islands and east coast, *Colenso*, etc. A common plant in Australia, Tasmania, and in many tropical and subtropical parts of the world.

8. ***L. clavatum***, *Linn.*;—var. *magellanicum*, *Fl. N. Z.* ii. 55. Stems stout, creeping below, rigid, 4–10 in. long; branches short, stout, erect, much fastigiately branched, 3–12 in. high. Leaves imbricating all round, spreading incurved or squarrose, sometimes subsecund, linear-subulate, quite entire, acuminate, not hair-pointed. Spikes 1–3 in. long, erect, cylindric, on solitary or twin, terminal, stout, leafy peduncles; leaves on the peduncles shorter, often whorled. Scales peltate, trapezoid, toothed at the base, with long recurved points. Spores granular.—*L. magellanicum*, *Swartz*; *L. fastigiatum*, *Br.*; *L. pichinchense*, *Hook. Ic. Pl. t. 85*.

Abundant in mountainous situations throughout the **Northern and Middle Islands**, *Banks and Solander*, etc. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* Most abundant in subalpine South America, Tasmania, Australia, and the Antarctic islands. This is the southern variety of *L. clavatum*, a very common plant in the northern and some parts of the southern hemisphere, which has usually more or less serrulate and hair-pointed leaves, but which is connected with it by numerous intermediate forms.

9. ***L. scariosum***, *Forst.*;—*Fl. N. Z.* ii. 55. Stems long, stout, creeping, often 2 ft. long, sparingly leafy, sending up prostrate or erect, flattened, flabellately divided branches 6–10 in. long and  $\frac{1}{4}$  in. broad. Leaves of 2 forms, the larger 2-farious, coriaceous, falcate, ovate lanceolate, acute or acuminate, laterally flattened, sessile, decurrent,  $\frac{1}{8}$  in. long, dark green above, pale or glaucous below; smaller leaves appressed to the under surface of the branches, more numerous, subulate. Spikes 1–3 in. long, solitary or geminate, cylindric, on long or short peduncles, which are covered with imbricate subulate leaves. Scales somewhat 6-farious, ovate; points broad, recurved, margins toothed. Spores areolate.—*Hook. Ic. Pl. t. 966*; *L. decurrens*, *Br.*; *L. Jussieni*, *Desv.*; *Hook. Ic. Pl. t. 186*; *L. Lessonianum*, *A. Rich.?*

On mountainous regions throughout the **Northern and Middle Islands**; more rarely in woods, *Banks and Solander*, etc. **Lord Auckland's** group, *Lyll*. Also found

in Tasmania and throughout the Andes of South America to Fuegia, and on the mountains of Jamaica.

10. **L. volubile**, *Forst.*;—*Fl. N. Z.* ii. 55. A lofty climber, festooning trees, etc. Stems slender, wiry, many feet long, much branched, sparingly leafy; branches spreading, compressed, dichotomously and flabellately divided. Leaves of 2 kinds, exactly as in *L. scariosum*, but with more acuminate points. Spikes in branched dichotomous panicles, slender,  $\frac{1}{2}$ – $2\frac{1}{2}$  in. long, cylindric, or obscurely 4-farious, pedicelled. Scales small, orbicular, suddenly contracted into a subulate point, margins toothed or entire. Spores broadly pyriform, broad end granular, the other transparent.—*Hook. and Grev. Ic. Fil.* t. 70; *L. D'Urvillei*, *A. Rich.*?

Abundant throughout the **Northern** and **Middle** Islands, *Banks and Solander*, etc. Also found in Java, but hitherto in no other part of the world. The most beautiful species of the genus.

A specimen of *L. Phlegmaria*, *Liun.*, a tropical species, having been mixed with Menzies' New Zealand collections, has been erroneously described as a native of these islands. Cunningham's specimens so named are *L. Billardieri*.

### 3. TMESIPTERIS, Bernhardt.

Roots fibrous.—Fronds pendulous, flaccid, simple or rarely branched; stipes angled. Leaves vertical, sessile, falcate, decurrent, oblong or ensiform, obtuse truncate or acute, rarely acuminate, coriaceous; costa stout, often excurrent, oblique; veins 0, fertile ones stalked, 2-lobed or 2 together with a capsule seated in the fork between them. Capsule transversely oblong, coriaceous, 2-lobed, 2-valved, bursting by a vertical slit. Spores most minute, oblong, curved.

A curious but very variable plant, found in Australia, the Pacific Islands, and California.

1. **T. Forsteri**, *Endlicher*;—*Fl. N. Z.* ii. 51. Stems 6–24 in. long. Leaflets  $\frac{1}{2}$ –1 in. long, pale green. Capsules  $\frac{1}{8}$  in. long.—*T. Tannensis*, *Labill. Fl. Nov. Holl.* t. 252.

Abundant throughout the **Northern** and **Middle** Islands: often epiphytic on tree-ferns, *Banks and Solander*, etc. **Lord Auckland's** group, *Bolton*.

### 4. PSILOTUM, Swartz.

Rhizome short, stout.—Fronds tufted, rigid, 3-quetrous, dichotomously branched above, leafless or with minute scattered scale-like leaves. Capsules in the axils of the minute scales, large, coriaceous, 3-lobed, 3-celled. Spores very minute, bursting when placed in water, oblong, hyaline, with a central pale nucleus.

1. **P. triquetrum**, *Swartz*. Fronds erect or pendulous, 2–12 in. long, green, slender, simple below, dichotomously branched above. Branches 3-gonous. Scales or leaves scattered,  $\frac{1}{8}$  in. long. Capsules  $\frac{1}{8}$  in. diam.—*Hook. Fil. Exot.* t. 63.

**Northern** Island: Motuhona Island, Bay of Plenty, *Jolliffe*. A common fern in very many parts, especially of the southern hemisphere, both temperate and tropical, also found in California.

## ORDER III. MARSILEACEÆ.

Creeping or floating, marsh or water plants. Stems with very slender vascular bundles, like those of *Lycopodiaceæ*.—Vernation circinate. Capsules of two kinds, one containing a single spore, the other many minute spores, enclosed in a receptacle (or common capsule) with valvular dehiscence; in some both kinds of capsule are enclosed in a common involucre, in others each kind is in a separate involucre. Of these spores the larger, which are solitary, reproduce the plant; the smaller, which are very numerous, contain cells with ciliated filaments.

The reproductive process in *Marsileaceæ* is analogous to that of ferns in many respects. The receptacles burst, and both kinds of spores are emitted; the larger develops a prothallium at its top, which terminates in one perforated conical papilla (archegonium), the perforation leading down to a cell in the body of the prothallium. This cell gives origin to the new plant; the small capsules (antheridia) emit cells containing each a spiral thread endowed with motion (spermatozoa), of which one, no doubt, enters the perforation of the papilla and fertilizes the cell at its base. Only one genus, *Azolla*, has been hitherto found in New Zealand; but as 2 others are common in Australia, these may be mentioned here, viz. *Pilularia*, which has creeping stems, subulate leaves, and globose involucre at the base of the leaves; and *Marsilea*, with a creeping stem, 4-foliolate leaves, and leaflets like Clover. The latter is the Nardoo of Australia, upon the starch contained in the capsules of which, Burke and his companion-explorers subsisted in the desert for some time.

1. *AZOLLA*, Linn.

Plant floating, forming small red patches, consisting of pinnate fronds covered with minute imbricating leaves. Roots of solitary simple threads.—Stem consisting of a central cellular axis with a few spiral threads, surrounded by a circle of air-cells. Receptacles very minute, pendulous from the under surface of the branches; the larger sort female, ovoid, bursting irregularly, full of spherical stalked capsules, each containing a few globular spores; smaller sort bursting transversely, containing rounded antheridia? peltately borne on the sides of a central erect column.

A genus of few species found in the warmer temperate and tropical zones, as far north as the United States; the following is the only one that inhabits cold countries. I have never examined the fructification, the generic description of which is taken from A. Gray's 'Manual of the Botany of the North United States.'

1. *A. rubra*, Br.;—*Fl. N. Z.* ii. 56. Frond red, ovate orbicular or somewhat triangular, 1–2 in. diam., pinnate; branches close-set, almost imbricating, somewhat palmate. Leaves densely imbricate, ovate, entire, obtuse,  $\frac{1}{20}$  in. long, smooth on the upper surface. Roots longitudinally plumose beyond the middle.

**Northern** Island: pools on the east coast and interior, *Colenso*. **Middle** Island: apparently common. Also found in Tasmania, Australia, and South America, and perhaps not specifically different from an African and North American plant.



## ORDER IV. MUSCI.

Cellular, usually tufted plants, rarely more than a few inches high and usually much less, with distinct erect or prostrate stems, generally branched but sometimes quite simple; cells and tubes composing the stems and leaves without transverse bars or spiral threads, except in *Sphagnum*. Leaves imbricate distichous or 3-8-farious, sometimes of two forms, one larger, the other resembling stipules; never lobed or divided; margin entire or toothed, sometimes thickened. The leaves at the base of the fruitstalk usually differ from the others, and are called *perichaetial* leaves. Reproductive organs of two kinds: *capsules*, containing minute spores, produced from archegonia; and *antheridia*, which are minute membranous sacs, by means of whose contents the archegonia are fertilized. I. CAPSULE (*theca*, *sporangium*) lateral or terminal on the branches, rarely radical, sessile or on a fruitstalk (*seta*), globose oblong-ovoid turbinate or pyriform, terete or angular, equal at the base or with a swelling (*apophysis* or *struma*) at its union with the fruitstalk, indehiscent or bursting by 4 valves at the sides (*Andræa*), or most commonly by a transversely deciduous cap (*operculum*), covered by a deciduous *calyptra*, which is entire (*mitriform*), or split on one side (*dimidiate* or *cucullate*). The operculum, on falling away, exposes a circular orifice or mouth of the capsule, which is usually open, rarely closed (in *Polytrichum* and its allies) by a transverse membrane; rim of the mouth naked or crowned with 1-3 concentric rows of appendages (*peristome*), consisting, 1. of the *annulus*, a row of loose cells that often curls upon removal; 2. of the *outer peristome*, a row of erect or incurved teeth, often reflexed when dry, separate or variously combined, free or united by transverse bars (*trabeculate*), simple or forked, straight or tortuous; 3. of the *inner peristome*, consisting of a fine membrane split into cilia or teeth; this membrane lines the capsule to its bottom, and is there drawn up as an axis or central column (*columella*). Spores numerous, escaping from the mouth of the capsule, green yellow or brown, simple or combined, without external covering or markings. II. ANTHERIDIA: Oblong or linear, stalked, membranous sacs, mixed with jointed filaments (*paraphyses*), surrounded by whorls of leaves (*perigonia*), either axillary or terminal on the stems or branches. The sacs have open mouths, and contain a multitude of cells, each with an enclosed spiral filament (*antherozoid*) endowed with motion. When the antheridia are on the same plant with the capsule, the Moss is called monœcious; when on separate, diœcious; in fewer cases the antheridia and archegonia (which become capsules) are found intermixed in the same inflorescence.

One of the most beautiful tribes of plants, found in all parts of the globe except the driest, abounding in temperate perennially humid latitudes, as the west coast of New Zealand, which is very rich in species.

The capsules, from whose form and structure the main divisional and generic characters are drawn, are thus developed. The female *inflorescence*, as it is called, consists of a terminal or axillary bundle of two or more archegonia, mixed with jointed filaments, and surrounded by perichaetial leaves. Archegonia are very slender, erect, cellular, flagon-shaped bodies, tumid and hollow at the base, the hollow being continuous upwards to the tip, which is open; a minute loose cell is contained in the base of their cavity. The process of fertilization has never been observed, but it is believed that one or more of the antherozoids, having escaped from the antheridia, find their way into the cavity of the archegonium, and

fertilize its contained cell ; it is, however, certain that from this cell the fruitstalk and capsule are developed. The upper part of the archegonium, after fertilization, swells very much into a campanulate body, which breaks away at its base, and is carried up, as the calyptra, by the lengthening fruitstalk ; the base of the archegonium, on the other hand, usually becomes a fleshy cylinder supporting the fruitstalk, and is called the *vaginula*. After the fruitstalk has attained some length, its apex begins to swell and to develop into the capsule. When the capsule is ripe it thus dehisces ; at the line of dehiscence one row of the cells of its cellular tissue enlarges, and pushes off the upper part or operculum ; this row of cells is the future *annulus* of the peristome. The spores are now ready to escape, and their exit is regulated in many species by the hygrometric action of the teeth of the peristome.

In germination, the spore emits cellular filaments, quite like the branches of a *Conferva*, which sometimes form matted, green, velvet-like patches ; on these threads the stems and rootlets are formed, the former growing upwards, the latter downwards. Dr. J. B. Hicks describes these filaments as giving rise to *gonidia* (reproductive cells, like those of Lichens). This subject is one of great interest and novelty, but most difficult of investigation, about which I must refer the reader to his valuable paper published in the Linnean Society's Transactions (vol. xxiii. p. 567).

By many muscologists, including Wilson, this Order has been considered as a family, and divided into three—*Andreaeaceæ*, *Bryaceæ*, and *Sphagnaceæ*. To me, however, these appear to form one Order, equivalent to one of the average Orders of Flowering Plants. Of the genera, *Andreaea* is, no doubt, one of the most remarkable in the dehiscence of its capsule ; but though differing from all other Mosses in this respect, the passage through *Phascum* to these is obvious. It further differs from most Musci in the capsule being seated directly on the vaginula, and in the colour of the foliage. The *Andreaeas* have been supposed to form a connecting link with the *Hepaticæ*, and in this respect of the dehiscence of the capsule they are, of all Mosses, those which show the nearest approach to that Order ; but the differences are far too great to justify their being regarded as intermediate in the proper sense of that term. *Sphagnum* is an even more peculiar genus ; it, too, wants the fruitstalk, and has the capsule supported on the vaginula directly, and it further has truly fascicled branches, no rootlets, peculiar antheridia, and the cellular structure of the leaves is of two kinds, usually furnished with pores and spiral fibres ; but besides *Sphagnum* showing in these respects no tendency to other Orders, we find an approach to the same cellular structure in *Leucotryum*, and a few other Mosses of very different affinity. A few muscologists have carried the subdivision of Mosses into Orders much further even than this ; but as the terms they use are not the equivalents of those used in other groups of plants, it is impossible to attach any precise value to such divisions. Thus, Dr. Schimper, of Strasburg, the most learned and able living muscologist, divides the Order into, first, *Musci* and *Sphagna*, and the *Musci* successively into Sections, Orders, Tribes, Families, and Genera—a sequence of terms not adopted in other branches of botany.

The Musci were worked up by Mr. Wilson, the most able British muscologist, for the 'Flora of New Zealand ;' and I have for the most part adhered to his generic characters and limitations ; having myself studied the species which I had collected, both in the Bay of Islands and in Lord Auckland's group, and prepared the analyses of the greater number figured in the 'Flora Antarctica,' we published under our joint names. Since that period many new species have been described by Mr. Mitten, to whom I am indebted for most cordial assistance in the following pages, and who has examined and named for the Hookerian Herbarium, all the specimens that have been received from recent New Zealand collectors. These I have incorporated in the present work, together with a few species which were published by C. Mueller in the 'Flora' (a German periodical) in 1855, a few months before the appearance of the 'New Zealand Flora,' but which were not known to Mr. Wilson or myself at the time of our printing the latter work. I extremely regret that my friend Mr. Wilson's health has prevented him from undertaking a revision of the New Zealand Mosses for this Handbook. A very considerable proportion of the Mosses here described are imperfectly known. In such genera as *Hypnum*, *Bryum*, *Dicranum*, etc., limits scarcely exist between the forms that compose some of the extensive groups ; and a special study of a large series of specimens from many parts of the islands is necessary to determine their limits, whether naturally or artificially.

The books that will prove most useful to the student of New Zealand Mosses are :—

Wilson's 'Bryologia Britannica,' 1 vol. 8vo, with 61 plates; Schimper's 'Synopsis Muscorum Europæorum,' 1 vol. 8vo; Hooker's 'Musci Exotici,' 2 vols. 8vo, with 200 plates; C. Mueller's 'Synopsis Muscorum Frondosorum,' 2 vols. 8vo; Hedwig's 'Species Muscorum,' and Schwagrichen's Supplements to the same, in several volumes, 4to, with between 300 and 400 plates. The New Zealand, Tasmanian, and Antarctic Floras, all expensive works in quarto, also contain very numerous plates of New Zealand Mosses.

# KEY TO THE GENERA OF NEW ZEALAND MOSSES.

**A. Acrocarpi.**—*Fruitstalk springing from the ends of the branches (lateral in one Fissidens, apparently lateral but really terminal in Sphagnum, Dicnemou, Hedwigia, Mielihoferia, etc.).*

**I. Leaves inserted all round the stem or branches.** (*Distichous in Distichium.*)

§ *Operculum adherent, never falling away.*

Capsule bursting by 4 lateral slits . . . . . 1. ANDRÆEA.  
Capsule bursting irregularly . . . . . 3. PHASCUM.

§§ *Operculum falling away.*

Division 1. ASTOMI.—*Peristome 0.*

\* *Capsule sessile on a short white receptacle* . . . . . 2. SPHAGNUM.

\*\* *Capsule on a distinct (often very short) red, yellow, or brown fruitstalk.*

† *Calyptra mitriform. Capsule erect.*

Capsule obovate or clavate; operculum conical. Leaf-cells large, lax 43. PHYSCOMITRIUM.  
Capsule cylindric; beak of operculum straight. Calyptra very large 21. ENCALYPTA.  
Capsule ovoid, grooved. Calyptra plicate, lacerate at the base . . 27. MACROMITRIUM.  
Capsule globose, sessile amongst the perichætal leaves . . . . 22. HEDWIGIA.

†† *Calyptra cucullate.*

a. *Capsule globose.*

Stems  $\frac{1}{2}$ –2 in. long. Fruitstalk short. Operculum beaked . . . 22. HEDWIGIA.  
Stems 2–6 in. long. Fruitstalk long, slender. Operculum beaked 23. BRAUNIA.  
Stems  $\frac{1}{8}$ – $\frac{1}{4}$  in. long. Fruitstalk 0. Operculum scarcely beaked . 24. LEPTANGIUM.

β. *Capsule not globose.*

Mouth with a membranous ring. Leaves piliferous; cells large, lax 31. LEPTOSTOMUM.  
Mouth without a membranous ring. Leaf-cells minute.

Capsule erect, ovoid, not grooved. Operculum with an acute inclined beak . . . . . 5. GYMNSTOMUM.

Capsule erect, ovoid, grooved or striate. Operculum with an acute inclined beak . . . . . 30. ZYGODON.

Capsule suberect, ovoid-oblong, smooth. Operculum hardly beaked. Nerve of leaf very thick . . . . . 18. DESMATODON.

Division 2. APLOPERISTOMI.—*Peristome single.*

\* *Calyptra mitriform, plaited. Capsule erect.*

Capsule ovoid. Calyptra lacinate at the base . . . . . 28. MACROMITRIUM.  
Capsule pyriform. Calyptra crenate at the base, usually very hairy 29. ORTHOTRICHUM.

\*\* *Calyptra mitriform, not plaited. Capsule erect.*

Calyptra split at the base . . . . . 25. GRIMMIA.  
Calyptra fringed at the base . . . . . 26. RACOMITRIUM.

\*\*\* *Calyptra cucullate, mitriform in one Tortula. (See Grimmia, in \*\*.)*

Peristome a membranous ring . . . . . 31. LEPTOSTOMUM.  
Peristome of distinct teeth.

*a. Capsule erect or nearly so, not globose. Teeth 8, 2-fid, or 16 equidistant, or 32 in pairs, rarely in fours, then short, broad.*

† Cells of leaf large, lax.

Teeth erect, when dry . . . . . 43. ENTOSTHODON  
Teeth recurved when dry . . . . . 45. EREMODON.

†† Cells of leaf minute.

Teeth recurved when dry. Capsule grooved. . . . . 30. ZYGODON.  
Teeth erect or recurved when dry. Capsule not grooved. Perichætal leaves short . . . . . 5. WEISSIA.  
Teeth incurved when dry. Capsule not grooved. Perichætal leaves very long, sheathing the fruitstalk . . . . . 6. SYMBLEPHARIS.

*β. Capsule globose, inclined; mouth small; teeth 16, united by their tips.*

Leaves subulate, serrate . . . . . 39. CONOSTOMUM.

*γ. Fruitstalk long and slender. Capsule erect or nearly so, narrow ovoid-oblong or cylindrical, rarely slightly curved, quite equal at the base. Teeth 16, 2-3-fid, or 32 in pairs, slender, erect or incurved when dry.*

Leaves broad, soft, papillose at the back; nerve very thick. Teeth 16, 2-3-fid . . . . . 18. DESMATODON.  
Leaves narrow. Teeth 16 or 32, lanceolate, entire 2-fid or perforate, fragile, irregular . . . . . 17. DIDYMODON.  
Leaves narrow, distichous. Teeth 16, equidistant . . . . . 19. DISTICHUM.  
Leaves narrow. Teeth 16, perforated, or 32 in pairs, slender, erect, of one series of cells . . . . . 15. TRICHOSTOMUM.  
Leaves broad or narrow. Teeth 32, slender, twisted, of two series of cells . . . . . 16. TORTULA.

*δ. Fruitstalk long or short. Capsule inclined cernuous or pendulous, more or less curved and unequal at the base. Teeth 16, equidistant, 2-fid, or 32 in pairs.*

† Fruitstalk erect. Calyptra not fringed at the base.

Stems creeping. Fruitstalk clothed with long perichætal leaves.  
Teeth 16, 2-fid . . . . . 9. DICNEMON.  
Stems erect.  
Teeth 32, united by trabeculae . . . . . 20. CERATODON.  
Teeth 16, 2-fid. Leaves thick, white, spongy . . . . . 10. LEUCOBRYUM.  
Teeth 16, 2-fid. Leaves of ordinary texture . . . . . 11. DICRANUM.

†† Fruitstalk curved or flexuose.

Capsule ovoid, furrowed. Calyptra fringed at the base. Teeth 16, 2-fid . . . . . 13. CAMPYLOPUS.  
Capsule oblong, not furrowed. Calyptra entire at the base. Teeth 16, 2-partite . . . . . 12. DICRANODONTIUM.  
Capsule pyriform, with a long narrow struma. Calyptra inflated. Teeth 32, granulate . . . . . 14. TREMATODON.  
Capsule pyriform, with a tapering struma. Calyptra small, narrow. Teeth 16, connate at the base . . . . . 35. MELICHOFERIA.

*ε. Teeth 32 or 64, very short, equidistant, horny.*

Stout, erect, rigid Mosses. Leaves usually lamellate, brown or lurid green . . . . . 46. POLYTRICHUM.

#### Division 3. DIPLOPERISTOMI.—Peristome double.

Capsule horizontal, flat above, convex below. Teeth innumerable, forming a filiform brush . . . . . 47. DAWSONIA.  
Capsule terete. Teeth short, definite in number.



\* *Calyptra mitriform, plicate. Capsule erect; beak of operculum long, erect.*

- Calyptra with 4 or more inflexed lobes at the base . . . . . 27. SCHLOTHEIMIA.  
 Calyptra not inflexed, but lacinate at the base . . . . . 28. MACROMITRIUM.  
 Calyptra (usually very hairy) not inflexed, crenate or split at the  
 base . . . . . 29. ORTHOTRICHUM.

\*\* *Calyptra cucullate.*

- a. *Leaves long, subulate, serrate; cells minute. Teeth incurved.*  
 Capsule globose, furrowed; operculum nearly flat . . . . . 41. BARTRAMIA.  
 Capsule oblong, erect, hidden by the leaves; operculum convex,  
 apiculate . . . . . 40. CRYPTOPODIUM.  
 β. *Leaves short, entire; cells minute. Capsule erect, ovoid,  
 grooved; outer teeth recurved when dry . . . . . 30. ZYGODON.*  
 γ. *Leaves flaccid; cells large, lax. Capsule pyriform, inclined  
 or pendulous; mouth small; teeth horizontal . . . . . 42. FUNARIA.*  
 δ. *Leaves various. Capsule cylindric, pyriform or clavate, suberect  
 inclined or pendulous; outer teeth erect or spreading.*

† *Capsule suberect.*

- Capsule narrow, cylindric, furrowed . . . . . 32. AULACOMNION.  
 Capsule oblong, furrowed . . . . . 33. ORTHODONTIUM.  
 Capsule clavate, pyriform, not furrowed . . . . . 34. BRACHYMENIUM.  
 Capsule clavate, pyriform, curved, gibbous, with a small oblique  
 mouth . . . . . 38. MEESIA.

†† *Capsule horizontal or drooping, smooth.*

- Shoots from the sides or tops of the stems. Operculum shortly  
 beaked or not beaked . . . . . 36. BRYUM.  
 Shoots from the bases of the stems, often creeping. Operculum  
 with a long beak. Leaves large, flaccid . . . . . 37. MNIMUM.

II. *Leaves distichous or 2-3-farious. (See Distichium in I.)*

- Peristome 0. Leaves 3-farious, of 2 forms, the lateral distichous . 69. CALOMNION.  
 Teeth 16, 2-fid, spreading when dry. Leaves distichous, equitant . 7. FISSIDENS.

**B. Pleurocarpi.**—*Fruitstalk springing from the sides of the branches. (See Fissidens adiantoides and Sphagnum, Dicnemon, Melichhoferia and Hedwigia, which have apparently lateral fruitstalks under A.)*

Division 1. ASTOMI.—*Peristome 0.*

- Leaves imbricate all round the stem . . . . . 47. ANÆCTANGIUM.  
 Leaves distichous . . . . . 49. AULACOPILUM.

Division 2. APLOPERISTOMI.—*Peristome single.*

\* *Leaves distichous or tristichous.*

- Calyptra mitriform, hairy, torn at the base. Teeth 16, entire.  
 Leaves complicate, keeled, shining . . . . . 58. PHYLLOGONIUM.  
 Calyptra cucullate. Teeth 16, membranous, united at the base.  
 Leaves piliferous, papillose . . . . . 66. HYMENODON.  
 Calyptra cucullate. Teeth 16, 2-fid, red. Fruitstalk moderate . 7. FISSIDENS.  
 Calyptra mitriform. Teeth 16, 2-fid, red. Fruitstalk very short . 8. CONOMITRIUM.  
 Calyptra mitriform, lacerate at the base. Teeth 16, membranous,  
 united at the base. Leaves ciliate . . . . . 67. HYPOPTERYGIUM.

\*\* *Leaves not distichous. Calyptra cucullate.*

- Teeth 16, short, membranous entire. Calyptra clothed below with  
 long hairs . . . . . 52. LEPTODON.  
 Teeth 16, 2-3-partite, united at the base . . . . . 51. LEUCODON.  
 Teeth 16, in pairs, inflexed, entire . . . . . 50. FABRONIA.  
 Teeth 16, short, free, lacerate at the apex . . . . . 57. MESOTUS.

Division 3. DIPLOPERISTOMI.—*Peristome double.*\* *Calyptra cucullate.**a. Leaves strongly distichous, tristichous or bifarious.*† *Fruitstalk very short.*

Leaves distichous, oblique, broad, shining. Capsule erect . . . 59. NECKERA.

†† *Fruitstalk moderate or long.*

Leaves distichous, not oblique, serrate. Capsule erect . . . 60. TRACHYLOMA.

Stems prostrate or creeping. Leaves distichous. Capsule cernuous or horizontal . . . 64. OMALIA.

Stems erect, hardly branched. Leaves distichous, strongly serrate. Fruitstalk from the base of the stem. Capsule inclined . . . 65. RHIZOGONIUM.

Stems dendroid, much branched. Leaves tristichous. Capsule suberect, cernuous or pendulous . . . 67. HYPOPTERYGIUM.

Stems creeping or prostrate. Leaves distichous, piliferous, nerveless. Capsule cernuous . . . 63. HYPNUM.

*β. Leaves imbricate all round the stem, secund or pointing every way, rarely obscurely distichous or bifarious.*† *Fruitstalk very short.*

Stem erect. Capsule not furrowed. Leaves with a stout nerve . . . 56. CYRTOPUS.

Rhizome creeping. Capsule erect, furrowed. Leaves nerveless or 2-nerved . . . 53. CLADOMNIUM.

Rhizome creeping. Stems pendulous, very long (erect in *M. nitens*). Leaves shining, membranous, concave. Capsule erect . . . 54. METEORIUM.

†† *Fruitstalk moderate or long.*

Habit dendroid. Stems naked below, above pinnately or verticillately branched. Capsule erect, or inclined by the curvature of the fruitstalk . . . 61. ISOTHECIUM.

Stems creeping or prostrate, pinnately or vaguely branched. Capsule curved, horizontal, or pendulous, not furrowed. Calyptra glabrous . . . 63. HYPNUM.

Stem compressed, pinnately branched. Capsule erect, straight, cylindric. Leaves entire, nerves 0, or 2, and short . . . 62. ENTODON.

Stems erect, simple. Leaves strongly serrate. Fruitstalk from the bases of the stems. Capsule inclined . . . 65. RHIZOGONIUM.

Stem creeping, branched. Leaves piliferous. Capsule curved, furrowed, cernuous. Calyptra hairy . . . 70. RACOPILUM.

\*\* *Calyptra mitriform.**a. Fruitstalk very short.*

Stem erect or pendulous, branched. Leaves imbricate all round the stem. Capsule erect, sunk in the perichaetial leaves . . . 55. CRYPHÆA.

Stem erect, unbranched. Leaves tristichous, dorsal small. Capsule erect, almost sessile . . . 68. CYATHOPHORUM.

*β. Fruitstalk moderate or long.*

Stems creeping, branched. Leaves obscurely tristichous, piliferous. Capsule curved, grooved. Calyptra hairy . . . 70. RACOPILUM.

Stems dendroid. Leaves tristichous, dorsal smaller. Capsule suberect cernuous or pendulous . . . 67. HYPOPTERYGIUM.

Stems suberect or creeping. Leaves more or less distichous; cells large, lax. Capsule cernuous. Teeth with transverse bars . . . 71. HOOKERIA.

Stems erect, tufted. Leaves imbricate all round. Capsule erect . . . 72. DALTONIA.

The arrangement adopted in this work is that which Mr. Wilson followed in the Floras of New Zealand and of Tasmania, viz. Dr. Schimper's, with a few unimportant modifications. This arrangement is natural, and the best hitherto devised, but, unfortunately, the characters of the groups do not contrast, and depend to so great a degree upon habit, texture, etc., that they cannot be expressed with sufficient definition for the purposes of a beginner. The following is the order of the Suborders, Tribes, and Genera:—

SUBORDER I. **Andreææ.**

1. Andreæa.

SUBORDER II. **Sphagnææ.**

2. Sphagnum.

SUBORDER III. **Bryææ.**Sect. 1. ACROCARPI.—*Fruit terminal.*

## Tribe I. PHASCEÆ.

3. Phascum.

## Tribe II. WEISSIÆ.

4. Gymnostomum.

5. Weissia.

6. Symblepharis.

## Tribe III. FISSIDENTEÆ.

7. Fissidens.

8. Conomitrium.

## Tribe IV. DICRANEÆ.

9. Dicnemum.

10. Leucobryum.

11. Dicrauum.

12. Dieranodontium.

13. Campylopus.

14. Trematodon.

## Tribe V. TRICHOSTOMEÆ.

15. Trichostomum.

16. Tortula.

17. Didymodon.

18. Desmatodon.

19. Distichium.

20. Ceratodon.

## Tribe VI. ENCALYPTEÆ.

21. Encalypta.

## Tribe VII. HEDWIGIACEÆ.

22. Hedwigia.

23. Braunia.

24. Leptangium.

## Tribe VIII. GRIMMIÆ.

25. Grimmia.

26. Racomitrium.

## Tribe IX. ORTHOTRICHEÆ.

27. Schlotheimia.

28. Macromitrium.

29. Orthotrichum.

## Tribe X. ZYGODONTEÆ.

30. Zygodon.

## Tribe XI. BRYÆ.

31. Leptostomum.

32. Aulacomnium.

33. Orthodontium.

34. Brachymenium.

35. Melichhoferia.

36. Bryum.

37. Mnium.

38. Meesia.

## Tribe XII. BARTRAMIEÆ.

39. Conostomum.

40. Cryptopodium.

41. Bartramia.

## Tribe XIII. FUNARIEÆ.

42. Funaria.

43. Entosthodon.

44. Physcomitrium.

## Tribe XIV. SPLACHNEÆ.

45. Eremodon.

## Tribe XV. POLYTRICHEÆ.

46. Polytrichum.

47. Dawsonia.

Sect. 2. PLEUROCARPI.—*Fruit lateral.*

## Tribe XVI. ANÆCTANGIÆ.

48. Anæctangium.

## Tribe XVII. FABRONIÆ.

49. Aulacopilum.

50. Fabronia.

## Tribe XVIII. LEUCODONTEÆ.

51. Leucodon.

52. Leptodon.

53. Cladominion.

## Tribe XIX. PILOTRICHEÆ.

54. Meteorium.

55. Cryphæa.

56. Cyrtopus.

57. Mesotus.

## Tribe XX. PHYLLOGONIEÆ.

58. Phyllogonium.

## Tribe XXI. NECKEREÆ.

59. Neckera.

60. Trachyloma.

## Tribe XXII. ISOTHECIEÆ.

61. Isothecium.

62. Entodon.

## Tribe XXIII. HYPNÆ.

63. Hypnum.

## Tribe XXIV. OMALIEÆ.

64. Omalia.

## Tribe XXV. RHIZOGONIEÆ.

65. Rhizogonium.

66. Hymenodon.

## Tribe XXVI. HYOPTERYGIEÆ.

67. Hypopterygium.

68. Cyathophorum.

69. Calomnion.

## Tribe XXVII. RACOPILEÆ.

70. Racopilum.

## Tribe XXVIII. HOOKERIEÆ.

71. Hookeria.

72. Daltonia.

1. **ANDREÆA**, Ehrhart.

Small, perennial, dark brown, purplish or black, monœcious or diœcious mosses, growing usually on rocks. Leaves often secund; cells dot-like. Fruitstalk terminal, short, seated on an elongated pale receptacle, as in *Sphagnum*. Capsule erect, black, splitting laterally into 4 valves, which are held together by the persistent operculum. Calyptra mitriform, small.

Arctic, alpine, and subalpine mosses, found in all mountainous countries; intermediate in respect of the form of the capsule between *Hepatica* and *Musci*.

Leaves nerveless.

- |  |                           |
|--|---------------------------|
| Leaves subulate-lanceolate, gibbous at the base . . . . .                    | 1. <i>A. acutifolia</i> . |
| Leaves ovate-subulate, papillose, spreading, sheathing at the base . . . . . | 2. <i>A. rupestris</i> .  |
| Leaves ovate-lanceolate, not papillose, erecto-patent . . . . .              | 3. <i>A. mutabilis</i> .  |
| Leaves oblong-ovate, obtuse, shining, erect . . . . .                        | 4. <i>A. nitida</i> .     |
| Leaves with a broad nerve, ovate-subulate, falcate . . . . .                 | 5. <i>A. subulata</i> .   |

1. ***A. acutifolia***, Hook. *f. and Wils. Fl. Antarct.* i. 118. *t.* 151. *f.* 2; —*Fl. N. Z.* ii. 57. Stems  $\frac{3}{4}$ –1 in. high. Leaves reddish or almost black, erecto-patent, incurved, erect when dry, subulate-lanceolate, acute, rigid, concave, nerveless, gibbous at the base; perichætil similar.

**Northern** Island: Ruahine range, *Colenso*. **Campbell's** Island: on rocks (barren), *J. D. H.* (Kerguelen's Land, Fuegia, and Andes of South America).

2. ***A. petrophila***, Ehrhart; —*Fl. Tasm.* ii. 161. —*A. rupestris*, *Fl. N. Z.* ii. 57, not of Linn. Stems very short. Leaves reddish-brown, not glossy, spreading, often subsecund, ovate-subulate or acuminate, base sheathing, back papillose, appressed when dry, nerveless. — *Wils. Bryol. Brit.*

**Northern** Island: on the mountains, *Colenso*. (Fuegia, Tasmania, Andes of South America, Europe, and most subalpine regions.)

3. ***A. mutabilis***, Hook. *f. and Wils. Fl. Antarct.* i. 119. *t.* 57. *f.* 2. Stems  $\frac{1}{2}$ –1 in. high, naked below, branched above, slender. Leaves red-brown, yellow at the base, erecto-patent, appressed when dry, rarely falcate and secund, lauceolate or ovate-lanceolate, slightly concave, nerveless, hardly papillose at the back; perichætil longer, elliptic-lanceolate, convolute.

**Lord Auckland's** group and **Campbell's** Island: on rocks on the hills, *J. D. H.* (Falkland Islands). Near *A. rupestris*, but the leaves are more erect and narrower.

4. ***A. nitida***, Hook. *f. and Wils. Fl. Antarct.* i. 118. *t.* 57. *f.* 3. Stems suberect,  $\frac{1}{2}$ – $\frac{3}{4}$  in. high, sparingly branched. Leaves red-brown or black-purple, crowded, suberect or erecto-patent, scarcely crisped when dry, ovate-oblong, obtuse, apiculate, nerveless, shining, concave; margins reflexed; perichætil longer, erect. Antheridia 6, with a few paraphyses mixed; archegonia 4, without paraphyses.

**Lord Auckland's** group: on rocks on the hills, rare, *J. D. H.* A very distinct and curious species. (Tasmania).

5. ***A. subulata***, Harvey in Hook.  *Ic. Pl. t.* 201; —*Fl. Antarct.* i. 119. *t.* 57. *f.* 1. Stems rather branched. Leaves red-brown, falcate, secund, subulate from a dilated base, concave, rigid; nerve very broad and thick; perichætil small, very inconspicuous.

**Lord Auckland's** group and **Campbell's** Island: rocks on the hills, *J. D. H.* (Tasmania, Australia, Cape of Good Hope, and Fuegia). The specimens from South Africa have larger perichætil leaves.



## 2. SPHAGNUM, Linn.

Flaccid, white or pale-pink, branched, monœcious or diœcious mosses, growing in water bogs or wet woods; branches fascicled or whorled. Leaves of very narrow long cells, forming a network, between whose meshes are larger thin-walled cells, often marked with a spiral line and pierced with large pores. Fruitstalk axillary, at first lateral, but by elongation of the receptacle apparently terminal (*cladocarpous*). Capsule erect, dark-brown, without annulus or teeth. Operculum small, flattish. Calyptra rupturing transversely from the receptacle, the lower part adhering to the fruit; antheridia subspherical, as in *Jungermannia*.

A considerable genus of very variable mosses, found in all parts of the world, especially alpine and temperate, contributing extensively to the formation of peat. The species are most difficult of determination, being variable in size and habit, and the specific characters are to a great extent founded on structural peculiarities, the relative constancy of which may be much overrated. Much stress is laid upon the presence or absence of spiral marks within the cells of various parts of the plant; and on the number of series of cells forming the periphery (cortex) of the stem and branches.

The genus itself forms an Order, distinct from that of mosses, in the opinion of many modern Cryptogamists, but though most peculiar in habit and mode of growth, and differing in so many details from all other mosses, I do not think that it should be so regarded, the essential structure of the organs of reproduction being the same, and the range of variation amongst *Musci* in both habit and characters being very wide.

Branches with one or two cortical layers of cells.

- |  |                                |
|--|--------------------------------|
| Leaves ovate-acuminate . . . . .                     | 1. <i>S. cuspidatum</i> .      |
| Leaves subovate, obtuse or præmorse . . . . .        | 2. <i>S. subsecundum</i> .     |
| Leaves obovate-oblong, obtuse, denticulate . . . . . | 3. <i>S. novo-Zelandicum</i> . |

Branches with three or more cortical layers of cells.

- |  |                            |
|--|----------------------------|
| Cells of branches with spiral fibres . . . . .           | 4. <i>S. cymbifolium</i> . |
| Cells of branches without spiral fibres.                 |                            |
| Stem-leaves fimbriate at the tip . . . . .               | 5. <i>S. fimbriatum</i> .  |
| Leaves of branches ovate, obtuse . . . . .               | 6. <i>S. australe</i> .    |
| Leaves of branches orbicular-ovate, obtuse . . . . .     | 7. <i>S. antarcticum</i> . |
| Leaves of branches ovate-lanceolate, acuminate . . . . . | 8. <i>S. acutifolium</i> . |

1. ***S. cuspidatum***, Ehrhart;—*Fl. N. Z.* ii. 58. Stems long, weak, flaccid; branches remote, fascicled, deflexed, narrowed to the apex. Stem-leaves ovate, acute, spreading; branch-leaves lanceolate-acuminate; margin waved when dry; perichætal acute. Inflorescence diœcious.—Wils. Bryol. Brit. 21. t. 61.

Var. *β. recurvum*. Leaves shorter, recurved when dry.—*S. recurvum*, Pallisot.

Var. *γ. plumosum*. Leaves longer, more attenuated.—*S. plumosum*.

**Northern Island, Colenso.**—Var. *γ*, Oldfield's collection. The above is taken from Wilson. Schimper describes this species as having two layers of cortical cells, Mitten as having but one. (Europe, Fuegia, etc.).

2. ***S. subsecundum***, Nees and Hornsch.?—*S. compactum*, var. *ambiguum*, *Fl. N. Z.* ii. 57. Stems erect, cæspitose, fastigiate; branches crowded, short, erecto-patent; cortical cells in one layer, without spiral fibres. Leaves subovate; apices scarcely incurved, obtuse or præmorse.

**Northern Island:** marshes, Bay of Islands, etc., Colenso, etc. A very doubtful plant, differing from *S. compactum* in the cortical cells being in only one layer, referred by Mr. Mitten to *S. subsecundum*, which is a native of Europe, etc.

3. ***S. novo-Zelandicum***, Mitten in *Journ. Linn. Soc.* iv. 99. Habit

compact of *S. cymbifolium*. Cortical cells without spiral fibres. Leaves, cauline obovate-lingulate, obtuse, denticulate; branch-leaves ovate acuminate.

**New Zealand**, Northern Island: *Kerr, Knight*. Description abridged from Mitten's.

4. ***S. cymbifolium***, *Dillenius*;—*Fl. N. Z.* ii. 57. Stems long, stout; branches crowded, short, tumid. Cortical cells of the branches in several series, with spiral fibres. Leaves broadly ovate or orbicular-ovate, obtuse, concave, minutely rough below the tip. Inflorescence diœcious.—*Wils. Bryol. Brit.* 17. t. 4.

**Northern and Middle Islands**: common, *Colenso, Sinclair, Haast*, etc. (Various temperate climates).

5. ***S. fimbriatum***, *Wils. in Fl. Antarct.* 398;—*Fl. N. Z.* ii. 57. Stems long, slender; branches slender, deflexed, with narrow tips. Stem-leaves obovate, obtuse, fimbriate at the tip, others ovate-lanceolate, acuminate; perichætil obovate, obtuse, cucullate. Inflorescence monœcious.—*Wils. Bryol. Brit.* 21. t. 60; *S. acutifolia*, *Mont. Voy. au Pôle Sud, Bot. Crypt.* 282.

**Middle Island**, *Lyall* (a scrap), identified by Wilson. The cauline leaves are loosely reticulated, the proper cells are full of chlorophyll, the interstitial without a spiral fibre (*Fuegia*, Falkland Islands, Britain, etc.).

6. ***S. australe***, *Mitten in Fl. Tasm.* ii. 162.—*S. compactum*,  $\gamma$ . *ovatum*, *Fl. Antarct.* 122. Habit, etc., of *S. cymbifolium*, but the cortical layers of cells have no spiral fibres. Leaves of branches ovate, obtuse, of branchlets ovate-lanceolate, obtuse.

**Campbell's Island**: in bogs, *J. D. H.* (Tasmania).

7. ***S. antarcticum***, *Mitten in Journ. Linn. Soc.* iv. 100. Also similar to *S. cymbifolium*, but differing in the cortical cells having no spiral fibre. From *S. australe* it differs in the suborbicular leaves of the branchlets.

**Campbell's Island**: in bogs, *J. D. H.*

8. ***S. acutifolium***, *Ehrhart*. Stem elongate; branches crowded, slender, attenuate, cortical cells in 3 or 4 layers, without spiral fibres. Leaves of stem ovate, erect, of branches crecto-patent, ovate-lanceolate, tapering, subacute, imbricate.—*Wils. Bryol. Brit.* 20. t. 4.

**Chatham Island**, *W. Travers*; determined by Mitten. (Europe, etc.)

### 3. PHASCUM, Linn.

Extremely minute, monœcious, green, ephemeral mosses, growing on earth, mudbanks, etc. Fruitstalks terminal, very short. Capsule erect, not dehiscent. Operculum persistent and continuous with the capsule. Calyptra campanulate or cucullate.

A considerable genus in temperate regions, rare in tropical; the species, owing to their most minute size and fugacious character, are often overlooked, and require high powers of the microscope for their study. The genus has been divided by modern Cryptogamists into eight or more.

Stems annual, erect, simple . . . . . 1. *P. apiculatum*.  
Stems perennial, creeping . . . . . 2. *P. nervosum*.

1. ***P. (Acaulon) apiculatum***, *Hook. f. and Wils. Fl. N. Z.* ii. 58. t. 83. f. 1. A minute gregarious annual moss, each plant simple, the size of a grain

of mustard, consisting of a little ball of leaves surrounding a capsule. Leaves few, closely imbricate, two inner the largest, broadly obovate-rotundate, acute or acuminate, very concave, quite entire; nerve excurrent; apex erect; margins not recurved. Capsule immersed, globose, erect; fruitstalk very short. Calyptra very minute.

**Northern Island:** Hawke's Bay, on the ground, *Colenso*. (Tasmania.) Allied to the British *P. muticum*. Mitten (Journ. Linn. Soc. Bot. iv. 71) has pointed out that the figure of the calyptra in Fl. N. Z. is quite erroneous. It belongs to the subgenus *Acaulon*, which are annual, simple, and have globose immersed capsules with a minute calyptra.

2. **P. (Pleuridium) nervosum**, Hook. Musc. Exot. t. 105;—*Fl. N. Z.* ii. 58. A minute, creeping, perennial moss; stems short, nearly simple. Lower leaves ovate; upper elliptic-lanceolate, acuminate, entire or denticulate, appressed; nerve stout, excurrent. Fruitstalk very short, straight or curved. Capsule immersed or exerted, apiculate.

**Northern Island:** Bay of Islands, in clay hills, *Colenso, J. D. H.* (Australia, South Africa, North America).

#### 4. GYMNSTOMUM, Hedwig.

Tufted, usually short, green, monœcious or diœcious mosses, of various habits, usually growing on rock or earth. Fruitstalk terminal, slender, rarely short. Capsule erect, rarely inclined; annulus obscure, persistent; teeth 0. Operculum obliquely beaked. Calyptra cucullate.

For other acrocarpous mosses, without peristome, that might be referred here, see in *Weissia*, *Didymodon*, *Macromitrium*, *Zygodon*, *Leptostomum*, *Physcomitrium*, and *Hedwigia*.

A very large genus, common in temperate countries, rarer in arctic and tropical; as formerly constituted, it contains mosses of very various affinities, which agreed only in wanting the peristome; recently, however, it has been restricted to mosses which, but for the above character, would be referred to *Weissia*.

Leaves linear-lanceolate; margins flat . . . . . 1. *G. calcareum*.  
Leaves oblong-lanceolate; margins incurved . . . . . 2. *G. tortile*.

1. **G. calcareum**, Nees and Hornsch.;—*Fl. N. Z.* ii. 59. Very minute; stems densely tufted,  $\frac{1}{8}$ — $\frac{1}{4}$  in. high, branched, very slender. Leaves spreading, linear-lanceolate, rather obtuse, sometimes crisped when dry; margins flat. Fruitstalk very slender,  $\frac{1}{8}$  in. long. Capsule oval-oblong; neck short; mouth red; operculum conico-subulate, nearly as long as the capsule.

**Northern and Middle Islands:** Bay of Islands, on clay soil, the form with crisped leaves, on lime in walls, *J. D. H.*; Nelson, *Mantell*; Otago, *Hector and Buchanan*. (Europe, India, and Australia). I follow Mr. Wilson in placing this moss in *Gymnostomum*, on account of the absence of peristome; the European state has 16 equidistant teeth, and is *Seligeria calcarea*, Br. and Sch. (Wils. Bryol. Brit. 54. t. 15).

2. **G. tortile**, Schwægrichen;—*Fl. N. Z.* ii. 59. Stems branched,  $\frac{1}{6}$ — $\frac{1}{3}$  in. high, pulvinate-cæspitose; branches fastigiate. Leaves crowded, spreading, curved upwards, twisted when dry, oblong-lanceolate, rather obtuse acuminate or apiculate; margins incurved, quite entire; nerve thick. Capsule ovoid, rather thick; operculum with a long beak.—Wils. Bryol. Brit. 45. t. xxxviii.; *Hymenostomum*, Bridel, Bryol. Europ.

**Northern Island:** Bay of Islands, on clay soil, *Colenso, J. D. H.*; North Cape, *Jol-*

*liffe*; Auckland, *Knight*. Very similar to *Weissia controversa*, but more robust, foliage firmer, less incurved at the margin, and peristome 0. (Europe, S. Africa.)

### 5. **WEISSIA**, Hedwig.

Tufted, green, usually short, monœcious or diœcious, perennial mosses, of various habit. Leaves spreading, curved and crisped when dry, nerved; cells minute. Fruitstalk terminal, usually slender. Capsule erect, oval-oblong; annulus persistent or 0; teeth 16 (rarely 0), in one row, equidistant, free to the base, transversely barred, entire or perforate, apices sometimes 2-fid. Operculum obliquely beaked. Calyptra cucullate.

An extensive genus, especially abundant in temperate regions.

Fruitstalk slender. Capsule exerted.

- |   |                            |
|---|----------------------------|
| Leaves lanceolate, spreading; margin incurved . . . . .           | 1. <i>W. controversa</i> . |
| Leaves narrow-lanceolate, spreading; margin nearly flat . . . . . | 2. <i>W. flavipes</i> .    |
| Leaves subulate-lanceolate, secund . . . . .                      | 3. <i>W. crispula</i> .    |
| Leaves oblong below, subulate above . . . . .                     | 4. <i>W. irrorata</i> .    |
| Fruitstalk very short. Capsule immersed . . . . .                 | 5. <i>W. contecta</i> .    |

1. **W. controversa**, *Hedwig*;—*Fl. N. Z.* ii. 59. Tufted, bright green; stems short. Leaves spreading, linear-lanceolate or lanceolate, mucronate; margins quite entire, incurved or involute; nerve excurrent. Fruitstalk  $\frac{1}{6}$ – $\frac{1}{4}$  in. long. Capsule ovoid, substriate when dry; teeth linear-lanceolate, rather obtuse, nearly entire; operculum conical, beaked.—*Wils. Bryol. Brit.* 46. t. xv.

**Northern** Island: Bay of Islands, on clay banks, *J. D. H.*; Auckland, *Knight*. (Tasmania, Europe, and many other countries.)

2. **W. flavipes**, *Hook. f. and Wils. Fl. N. Z.* ii. 59. t. 83. f. 2. Stems tufted,  $\frac{1}{4}$  in. high. Leaves erecto-patent, twisted inwards when dry, linear-lanceolate or linear from a broader base, apiculate; margin nearly flat or sub-incurved; nerve excurrent. Fruitstalk very slender,  $\frac{1}{2}$  in. long, yellow. Capsule cylindric, erect; mouth red; teeth 0 or acute, perforate, denticulate, tapering from the base, red; operculum with a slender beak.

**Northern** Island: Bay of Islands, on the ground, *J. D. H.*; Auckland, *Knight*, *Sinclair* (a form with no teeth). Mr. Wilson, who has examined the Auckland specimens very closely, finds no trace of teeth, and suggests that this may be a different species, for which he proposes the name *Gymnostomum patulum*. The specimens are all immature. (Tasmania.)

3. **W. crispula**, *Ludwig*;—*Fl. Antarct.* i. 127. t. 58. f. 2. Stems tufted, bright green,  $\frac{1}{2}$ – $\frac{3}{4}$  in. high. Leaves imbricate, erecto-patent, secund, elongate, lanceolate-subulate, acuminate, channelled, quite entire, more or less crisp when dry; perichaetial acuminate, with an excurrent nerve. Fruitstalk  $\frac{1}{4}$  in. long. Capsule erect, oblong; teeth entire; operculum with a long slender beak, almost as long as the capsule.—*Wils. Bryol. Brit.* 48. t. xv.; *Blindia antarctica*, *C. Muell. Synops. Musc.* i. 344.

**Campbell's** Island: rocks on the mountains, abundant, *J. D. H.* This is a variety of the European plant (*B. ambigua*, *Wils.*), which has the leaves shorter, less secund, less crisped when dry, a shorter fruitstalk, and the teeth sometimes approximate in pairs. (Fuegia.)

4. **W. (Eucladium) irroratum**, *Mitten, mss.* Verdigris-green, in-



crusted with calcareous matter; stems about 1 in. high, with crowded shoots. Leaves erecto-patent, below oblong, above narrow linear-subulate, obtuse at the apex; nerve broad, papillose at the back; margin subdenticulate above and crenulate or papillose at the apex; lower cells oblong, green, pale, pellucid, upper shorter, subrotund; perichætil twice as broad, obtuse. Fruitstalk  $\frac{3}{4}$  in. long. Capsule ovoid; teeth short, red (*Mitten*).

**Northern** Island, *Stephenson*. *Mitten* describes this as resembling *W. verticillata*, Brid., but having narrower and more obtuse leaves.

5. **W. contacta**, *Hook. f. and Wils. Fl. Antarct.* 127. t. 58. f. 3. Stems densely tufted,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. high, rigid, fragile, fastigiately branched. Leaves dark-green, crowded, erect, striate, rigid, lanceolate below, narrowed into a long subulate point, channelled; nerve solid, excurrent; margin quite entire, below inflexed; perichætil similar, larger. Fruitstalk very short. Capsule immersed, ovoid; mouth open, exannulate; teeth yellow-red, reflexed when dry, pyramidal, entire or 2-fid; operculum with a long slender oblique beak. Calyptra small, subulate.—*Blindia*, C. Muell.

**Campbell's** Island: on alpine rocks, *J. D. H.* A remarkable plant, with the habit of some small *Dicrana*, but the teeth entire or nearly so. (*Kerguelen's Land*.)

## 6. SYMBLEPHARIS, Montagne.

Tufted perennial mosses, growing on trees or stones. Leaves long, slender; perichætil sheathing the fruitstalk; cells dot-like. Fruitstalk terminal, slender. Capsule erect, subcylindric; mouth small; annulus persistent; teeth 8, in one row, bigeminate, or 32 in fours, short, conniving into a cone when dry. Operculum with a very slender beak. Calyptra long, subulate, dimidiate.

A small genus, confined to the southern hemisphere. The name *Holomitrium* should, in *M. Mitten's* opinion, be retained for this genus.

Leaves erecto-patent, crisped when dry . . . . . 1. *S. perichætilis*.  
Leaves falcate-secund, unaltered when dry . . . . . 2. *S. pumila*.

1. **S. perichætilis**, *Wils. in Fl. N. Z.* ii. 60. Stem erect, branched,  $\frac{1}{2}$ –1 in. high. Leaves crowded, erecto-patent, crisped when dry, lanceolate below, narrowed to a long subulate point, quite entire, channelled; nerve continuous; margin flat; perichætil very long, sheathing. Fruitstalk  $\frac{1}{4}$ –1 in. long, pale; annulus small, persistent; teeth 32, erect or recurved when moist, dull red, 2-fid at the apex, perforate below; operculum as long as the capsule, almost setaceous. Calyptra twice as long. Male inflor. unknown.—*Trichostomum*, *Hook. Musc. Exot.* t. 73; *Olomitrium* and *Holomitrium*, *Bridel*; *Acalyphum cylindricum*, *Palisot*; *Sprucea*, *Hook. f. and Wils. Fl. Antarct.* i. 128.

Common throughout the **Northern** and **Middle** Islands, *Menzies*, etc., and **Campbell's** Island, *J. D. H.* (*Australia*, *Tasmania*, the *Mauritius*.)

2. **S. pumila**, *Mitten, mss.* Stems slender, tufted, brownish-green. Leaves all falcate and secund, unaltered when dry, circinate-curved, linear-lanceolate, gradually narrowed from the base, quite entire; nerve slender, percurrent; cells at the base large, pale, quadrate. Fruitstalk rather stout. Capsule immature.

**Middle** Island: dry ground, *Otago*, *Hector and Buchanan*. Allied to *H. antarcticum*,

C. Mueller, which has distinct masses of alary cells at the contracted bases of the somewhat crisped leaves (*Mitten*).

### 7. FISSIDENS, Hedwig.

Small, usually bright green, monœcious or diœcious mosses, growing on earth and stones, rarely on roots of trees. Leaves distichous, equitant, alternate, semiamplexicaul, the blade unequal-sided and vertical; cells minute or lax and distinct. Fruitstalk terminal in all but one of the New Zealand species, sometimes on short lateral shoots. Capsule erect inclined or cernuous; annulus 0 or present; teeth 16, in one row, equidistant, with a dark line down the middle, entire 2-fid or 3-fid at the apex, when dry spreading and curling outwards at the base and then inwards. Operculum conical or beaked. Calyptra cucullate, rarely mitriform.

A very large genus of mosses, abounding in all parts of the world except the arctic and alpine. The New Zealand species, I suspect, want a very careful re-examination, with much more numerous specimens than have been hitherto collected. The characters of several are very difficult to detect—if, indeed, they be valid,—especially the denticulation and thickened margin of the leaf, length of stem, and direction of the capsule.

Fruitstalk lateral . . . . . 1. *F. adiantoides*.

Fruitstalk terminal.

*a. Margin of leaf entire or nearly so, not thickened and hyaline.*

Stem  $\frac{1}{2}$ –1 in. Leaves crisped when dry. Fruitstalk stout . . . 2. *F. asplenioides*.

Stem  $\frac{1}{2}$ –1 in. Leaves not crisp when dry. Fruitstalk slender . . . 3. *F. oblongifolius*.

Stem  $\frac{1}{4}$  in. Leaves pale-yellow . . . . . 4. *F. pallidus*.

*b. Margin of leaf crenulate* . . . . . 5. *F. tenellus*.

*γ. Margin of leaf thickened and hyaline.*

Leaves nerveless . . . . . 6. *F. dealbatus*.

Leaves furnished with a nerve.

† Stems 1–2 in. long . . . . . 7. *F. rigidulus*.

†† Stems less than  $\frac{1}{2}$  in. long.

Leaves broad-lanceolate, apiculate . . . . . 8. *F. bryoides*.

Leaves lanceolate, acuminate . . . . . 9. *F. viridulus*.

Leaves ovate-acute, cymbiform . . . . . 10. *F. brevifolius*.

Leaves verdigris-green, opaque, lanceolate . . . . . 11. *F. æruginosus*.

1. ***F. adiantoides*, Hedwig.** Stems 1–2 in. high, elongate, branched. Leaves crowded, crisped and incurved when dry, ovate-lanceolate, denticulate at the apex, minutely serrate below, nerved to the apex. Fruitstalk lateral. Capsule cernuous, ovoid-oblong; operculum beaked.—Wils. Bryol. Brit. 307. t. 16.

**Middle Island:** Otago, in damp places, *Hector and Buchanan*. (Europe, Tasmania, N. America.)

2. ***F. asplenioides*, Swartz.**—*F. ligulatus*, Hook. f. and Wils. Fl. N. Z. ii. 63. t. 84. f. 1. Stems  $\frac{1}{2}$ –1 in. high, erect. Leaves very numerous, suberect, rather remote, crisped and involute when dry, ligulate, obtuse; margin subcrenulate or denticulate, not thickened; nerve stout, pellucid, not continuous to the apex; cells minute. Fruitstalk stout. Capsule cernuous, with a large mouth; operculum conic, beaked, half as long as the capsule; male inflorescence on separate stems from the female.

**Northern Island:** Bay of Islands, near waterfalls, *J. D. H.*, etc.; Auckland, *Knight*;

Wangaroa, *Jolliffe*. (Tasmania, Tristan d'Acunha.) M. Mitten has referred *F. lignatus* to *F. asplenoides*, Sw.

3. ***F. oblongifolius***, *Hook. f. and Wils. Fl. N. Z. ii. 62. t. 83. f. 8*. Stems  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, erect. Leaves very numerous, linear or linear-lanceolate, obtuse acute or acuminate, somewhat inflexed when dry; margin not thickened, quite entire except at the crenulate apex; nerve pale, pellucid, not continuous to the apex; cells roundish, opaque. Fruitstalk slender. Capsule very small, ovoid, inclined or subcernuous; operculum not seen. Male inflorescence axillary on the same stems with the female.

Var. *a*. Leaves linear, ligulate, obtuse.

Var. *b*. Leaves linear-lanceolate, acuminate.

**Northern Island**: Bay of Islands, on rocks near waterfalls, both varieties, *J. D. H.* (Tasmania.)

4. ***F. pallidus***, *Hook. f. and Wils. Fl. N. Z. ii. 62. t. 83. f. 7*. Stems tufted, decumbent, very small. Leaves flabellately spreading, pale yellow-green, glossy, inflexed but scarcely altered in drying, linear, hardly lanceolate, acute; margin not thickened, quite entire; nerve continuous to the apex; cells hexagonal, pellucid. Capsule cernuous; operculum longer than the capsule. Calyptra submitriform, inflexed at the base. Male inflorescence not seen.

**Northern Island**, *Colenso*. (Tasmania.)

5. ***F. tenellus***, *Hook. f. and Wils. Fl. N. Z. ii. 62. t. 83. f. 6*. Minute. Stems very short, decumbent. Leaves few, linear-lanceolate, acuminate, straight; margin not thickened, crenulate; sheathing base denticulate; nerve stout, concolorous, continuous to the apex, excurrent; cells minute. Capsule erect; annulus 0; operculum with a beak nearly as long as the capsule. Calyptra papillose at the apex. Male inflorescence basilar in Tasmanian specimens.

**Northern and Middle Islands**: Bay of Islands, *J. D. H.*; Auckland, *Sinclair*; Thomson's Sound, *Lyall*. (Victoria, Tasmania.)

6. ***F. dealbatus***, *Hook. f. and Wils. Fl. N. Z. i. 63. t. 84. f. 2*. Minute. Stems very short, not  $\frac{1}{6}$  in. long, slender, pale greenish-white. Leaves few, linear-oblong, acuminate; margin thickened, quite entire, nerveless; cells large, lax, rhomboid. Fruitstalk short. Capsule suberect, narrow-ovoid, contracted below the mouth; annulus 0; operculum conical, beaked, as long as the capsule. Calyptra red-brown. Male inflorescence on different stems from female.

**Northern Island**: Bay of Islands, on rocks near waterfalls, *J. D. H.*, growing with other mosses. (Tasmania.)

7. ***F. rigidulus***, *Hook. f. and Wils. Fl. N. Z. ii. 61. t. 83. f. 3*. Stem 1–2 in. long, slender, branched, leafy. Leaves rigid, crisped when dry, lurid green, ovate-lanceolate, subacute; margin broad, much thickened, entire; nerve continuous to the apex, pellucid, stout. Fruitstalk  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, pale, slender, sometimes several together. Capsule small, ovoid, oblique; operculum shortly beaked. Male inflorescence terminal.

**Northern and Middle Islands**: Bay of Plenty, *Jolliffe*; East Cape, *Sinclair*; Wel-

lington, *Lyall*; Auckland, *Knight*; Southern Alps, *Hector*, *Travers*, etc.; Chain Hills, Otago, *Lindsay*. (Tasmania.)

8. **F. bryoides**, *Hedwig*;—*Fl. N. Z.* ii. 61. Stems  $\frac{1}{6}$ – $\frac{1}{2}$  in. high. Leaves broadly lanceolate, apiculate; margin thickened, quite entire; nerve slightly excurrent. Fruitstalk red. Capsule elliptic-oblong, erect; operculum conical, acuminate. Male inflorescence axillary on the stem with the female.—*Wils. Bryol. Brit.* 304. t. xvi.

**Northern Island**: Bay of Islands, *J. D. H.* Specimens imperfect. (Europe, N. America.)

9. **F. viridulus**, *Wahlenberg*;—var. *acuminatus*, *Fl. N. Z.* ii. 61. Stems short, simple, decumbent. Leaves rigid, lanceolate, acuminate; margin much thickened, quite entire, blade on the lower half, not continued to the base; nerve nearly continuous to the apex. Capsule oblong-ovoid, erect; operculum conical, acuminate. Inflorescence monœcious, male terminal or basilar.—*Wils. Bryol. Brit.* 303. t. liii.

Var. *incurvus*. Capsule cernuous, curved.—*Wils. Bryol. Brit.* 303. t. 53; *F. incurvus*, *Schwæg.*—*Fl. N. Z.* ii. 61.

**Northern Island**: Bay of Islands, *Colenso* and *J. D. H.* (Europe, N. America, both vars.) Distinguished from *F. bryoides* by the male inflorescence being never axillary.

10. **F. brevifolius**, *Hook. f. and Wils.*;—*Fl. N. Z.* ii. 61. t. 83. f. 4. Stems very short,  $\frac{1}{2}$  in. long, giving off barren creeping shoots. Leaves on the shoots crowded, very shortly ovate, acute, cymbiform, lower margin not continued to the base; margins not thickened beyond the sheathing part, entire; nerve continuous to the apex; stem-leaves narrower, with a subulate or lanceolate acuminate blade. Capsule suberect or inclined; operculum conic with a short beak. Male inflorescence at the base of the barren shoots (axillary in a Tasmanian state).

**Northern Island**: *Colenso*. Allied to *F. viridulus*, but differing in bearing barren shoots, in the very short leaves, and in the thickening of the margin of the leaf being confined to the sheathing portion. (Tasmania, extratropical S. Africa, and S. America.)

11. **F. æruginosus**, *Hook. f. and Wils.*;—*Fl. N. Z.* ii. 62. t. 83. f. 5. Stems very short, decumbent. Leaves crowded, verdigris-green, narrow lanceolate, straight, acuminate, not crisped when dry, opaque; margin not thickened, minutely crenulate towards the apex; nerve pellucid, continuous to the apex; cells dot-like. Capsule not seen. Male inflorescence basal.

**Northern Island**: *Colenso*. Described from a few fragments only.

### 8. CONOMITRIUM, Montagne.

Aquatic, slender, branched mosses. Leaves distichous, equitant, alternate, semi-amplexicaul, the blade unequal-sided, vertical. Fruitstalk very short, lateral or terminal. Capsule small, erect, equal, gradually narrowed below; teeth 16, in one row, equidistant, regular or irregular, with no dark line down the centre, truncate, 2-fid at the apex. Operculum conical. Calyptra conical, nearly entire at the base.

A small genus of mosses, of which one species is European.

1. **C. Dillenii**, *Montagne*;—*Fl. N. Z.* ii. 63. Stems floating, simple



or branched. Leaves oblong-lanceolate, erect, straight, nerve not continuous to the apex. Fruitstalk short, lateral, solitary or 2 together. Capsule ovoid; operculum cuspidate, incurved; teeth regular or irregular.—Montagne in Ann. Sc. Nat. 1837, 250. *Skitophyllum*, La Pylaie. *Octodicerus*, Bridel.

**Northern** Island: East Coast, by watercourses, *Colenso*. (Australia, S. America.)

### 9. DICNEMON, Schwægr.

Creeping tufted mosses, with short erect curved branches, growing on trees. Leaves imbricate all round the stems. Fruitstalk terminal on very short lateral branchlets, clothed by the long perichætal leaves which partially hide the capsule also. Capsule elongate, oblique, inclined; teeth 16, in one row, 2-fid to below the middle, the divisions tubercled, incurved. Operculum with a slender oblique beak. Calyptra large, cucullate, rough at the apex, inflated when young.

A genus generally associated with *Leucodon*, but according to Wilson most clearly allied to *Dicranum*, and differing chiefly in the creeping habit.

1. **D. calycinum**, *Wils. and Hook.*;—*Fl. N. Z.* ii. 64. Stems creeping; branches erect or ascending, divided, 1–1½ in. long, stout, terete, acute. Leaves closely imbricate, pale yellow-green, ovate-lanceolate, concave, quite entire; nerve suddenly ceasing; perichætal large and sheathing. Fruitstalk ¼ in. long. Capsule narrow oblong, subcylindrical, somewhat curved and strumose, tapering into the fruitstalk. Male inflorescence hidden amongst the stem-leaves.—*Leucodon calycinus*, Hook. Musc. Exot. t. 17.

**Northern** and **Middle** Islands: on trunks of trees, common, *Menzies*, etc.

### 10. LEUCOBRYUM, Hampe.

Rather large, tufted, white, stout, perennial, monœcious mosses, growing in wet ground, in woods, and on trunks of trees. Leaves spongy, nerveless, glaucous, cells perforated. Fruitstalk terminal, but apparently lateral. Capsule cernuous, strumous, grooved when dry; annulus 0; teeth 16, in one row, subulate, transversely barred, 2-fid at the apex, rough externally. Operculum long-beaked. Calyptra inflated, cucullate, long-beaked.

A considerable tropical genus, rare in temperate regions, remarkable for its white colour, and the spongy texture of the leaves, which are formed of two layers of cells.

1. **L. candidum**, *Hampe*;—*Fl. N. Z.* ii. 64. Stems erect, tufted, ½–2 in. high, stout, brittle, dichotomously branched. Leaves densely imbricated, erect or falcate and recurved, ovate-lanceolate, concave, wrinkled at the back near the apex. Fruitstalks on short lateral branches. Capsule cernuous, strumose, grooved. Male inflorescence axillary, clustered, on separate stems.—*Dicranum*, Bridel. *L. brachyphyllum*, Hornsch., C. Muell. in Bot. Zeit. 1851, 546.

Common throughout the islands, on decayed trunks, etc., seldom fruiting. (Tasmania, Australia.)

### 11. DICRANUM, Hedwig.

Tufted, erect, green, perennial, monœcious or diœcious mosses, often large,

of various habit. Fruitstalks terminal, slender, sometimes 2–3 together. Capsule inclined or cernuous, often strumose, rather long; teeth 16, subulate, joined at the base, transversely barred, 2-fid (often unequally) to the middle, rarely 3-fid, when dry spreading at the base and then curling upwards. Operculum with a long oblique beak. Calyptra cucullate.

One of the largest genera of Mosses, very abundant in all regions of the globe, but especially the temperate and cold.

- I. **LEUCOLOMA**. Fruitstalk on a very short lateral shoot. Margin of leaf white, composed of long slender flexuous cells.  
 Upper cauline leaves piliferous . . . . . 1. *D. Sieberianum*.  
 Cauline leaves all acuminate . . . . . 2. *D. incanum*.
- II. **TRIDONTIUM**. Teeth usually 3-fid. Leaves oblong-lanceolate, obtuse . . . . . 3. *D. Tasmanicum*.
- III. **DICRANUM**. Margin of leaf not pellucid. Teeth 2-fid (rarely 3-fid).  
 \* Leaves with broad subquadrate sheathing bases.  
 Stems 1–2 in. Leaves squarrose. Capsule suberect . . . 4. *D. vaginatum*.  
 Stems  $\frac{3}{4}$ – $\frac{1}{2}$  in. Leaves flexuous. Capsule cernuous, strumose . 5. *D. Schreberi*.  
 Stems  $\frac{1}{4}$ – $\frac{1}{2}$  in. Leaves strict. Capsule suberect, not strumose . 6. *D. campylophyllum*.  
 \*\* Leaves without broad quadrate sheathing bases, usually secund.  
 Capsule equal, erect . . . . . 7. *D. trichopodium*.  
 Capsule unequal, inclined or cernuous.  
 † Stems stout. Perichaetial leaves long, striate.  
 + Nerve stout broad.  
 Leaves ovate-lanceolate below, setaceous above . . . . . 8. *D. dicarpon*.  
 Leaves convolute . . . . . 9. *D. robustum*.  
 ‡ Nerve more slender.  
 Stems 1 in. high. Leaves spinulose-serrate . . . . . 10. *D. fasciatum*.  
 Stems 2–4 in. high. Leaves serrated towards the tip . . . 11. *D. Billardieri*.  
 †† Stem stout or slender. Perichaetial leaves short.  
 Fruitstalk 1 in. long, stout . . . . . 12. *D. setosum*.  
 Fruitstalk hardly longer than the leaves . . . . . 13. *D. Menziesii*.

1. ***D. Sieberianum***, *Hornsch.*;—*Fl. N. Z.* ii. 67. Stems  $\frac{1}{2}$ –1 in. high, fastigiately branched,  $\frac{1}{10}$  in. diam. Leaves yellowish, falcate, convolute, ovate-lanceolate, acuminate, the upper piliferous, papillose at the back, perichaetial sheathing, piliferous; margin entire with a narrow pellucid border. Fruitstalks  $\frac{1}{2}$ –1 in. long, slender, red. Capsule small, ovoid, cernuous; operculum with a long beak.—*Leucodon pallidus*, Hook. Musc. Exot. t. 172.

Var.  $\beta$ . Leaves appressed when dry, nearly smooth at the back.

**Northern Island**: Bay of Islands.  $\alpha$ . *Cunningham*.  $\beta$ . On wet rocks, *J. D. II.* (Australia, Tasmania.)

2. ***D. incanum***, *Mitt. mss.* (*Leucoloma*).—Stems  $\frac{1}{2}$ –1 in. high, creeping below, fastigiately-branched. Leaves pale-yellow-green, erecto-patent, subsecund, rather crisped when dry, ovate-lanceolate, acuminate, convolute, none piliferous, except the perichaetial. Fruitstalk  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, red. Capsule subcylindrical; operculum with a beak as long as the capsule.

**Northern Island**: *Sinclair*. = Same type for *Sclerodontium sieberianum*

3. ***D. Tasmanicum***, *Hook. f. in Hook. Ic. Plant.* t. 248 (*Tridontium*);—*Fl. N. Z.* ii. 65. Stems erect, tufted, 1–2 in. high, branched. Leaves pale or dark green or reddish, lax, spreading, lanceolate-oblong, obtuse, channelled,

usually concave at the apex, quite entire; crisped and incurved when dry; nerve vanishing. Fruitstalk stout,  $\frac{1}{2}$  in. long. Capsule erect, turbinate; mouth large, teeth large, often 3-fid; annulus 0; operculum with a slender beak, longer than the capsule. Inflorescence diœcious.

**Northern** and **Middle** Islands: not uncommon on wet stones, rocks, etc. *Colenso*, etc. (Tasmania.)

4. **D. clathratum**, *Mitten*, mss.;—*D. vaginatum*, var. *clathratum*, Fl. N. Z. ii. 65. Stems 1–2, long, slender, branching. Leaves distant, imbricating, with a broad square sheathing base and long subulate rigid upper portion, the latter is squarrose when dry, almost entire or toothed at the apex, and wholly occupied by the stout nerve. Fruitstalk slender. Capsule ovoid or turbinate, erect or suberect; annulus 0; teeth long, papillose, variously perforate, sometimes 3-fid; operculum with a long beak. Inflorescence diœcious.

**Northern** Island: wet rocks, Bay of Islands, falls of the Keri-Keri river, *J. D. H.*

5. **D. Schreberi**, *Hedwig*;—*Fl. N. Z.* ii. 65. Stems tufted, short,  $\frac{1}{4}$ – $\frac{1}{3}$  in. high, nearly simple. Leaves with a broad sheathing base, and lanceolate-subulate, spreading, channelled, nearly entire upper part, which is flexuous when dry; nerve slender. Fruitstalks  $\frac{1}{4}$ – $\frac{1}{3}$  in. high. Capsule ovoid-oblong, cernuous, strumose; operculum with a short beak as long as the capsule. Inflorescence diœcious.—*Wils. Bryol. Brit.* 69. t. xxxix.

**Northern** Island: on moist banks, Bay of Islands, *J. D. H.* (Britain.) Mr. Wilson remarks that this differs from the European form in the entire leaves.

6. **D. campylophyllum**, *Tayl.*?—*Fl. N. Z.* ii. 65. Closely resembling *D. Schreberi*, but leaves longer and more rigid, less suddenly dilated below. Capsule less oblique, longer, without a strumose operculum.

**Northern** Island: *Colenso*. Hawke's Bay, *Jolliffe*. (Andes.)

7. **D. trichopodum**, *Mitten*, mss. Stems 1 in. high, tomentose. Leaves subsecund, pale yellowish, erecto-patent, base elliptic-oblong, then setaceous acuminate; nerve rigid, occupying the whole subulate portion of the leaf; margins serrulate at the apex; perichætil convolute, with long slender apices. Fruitstalk slender,  $\frac{1}{2}$  in. long, flexuous, yellow. Capsule cylindric-ovoid, equal, erect; mouth small; teeth short, red.—*Mitten*.

**Middle** Island: Otago. *Hector* and *Buchanan*. Foliage of *D. setosum* and capsule of *Holomitrium perichætiale*.

8. **D. dicarpon**, *Hörnseh.*;—*Fl. N. Z.* ii. 66. Stems tufted, robust, 1–2 in. high, densely covered with matted fibrils. Leaves spreading, squarrose or subsecund, linear-cuspidate, from an ovate-lanceolate base, flexuous, striate; margins and back spinulose-serrate; nerve solid. Fruitstalks 2 or more together, sheathed by long perichætial leaves. Capsules curved, cernuous; operculum with a long beak.—*Schwægr. Suppl.* t. 251. *D. leucolomoides*, C. Muell. in *Bot. Zeit.* 1851, 550.

**Northern** and **Middle** Islands, common. (Tasmania and Australia.) *D. spinosum*, *Wils.* mss., is considered by him a large variety with numerous (3–8) longer setæ.

9. **D. robustum**, *Hook. f. and Wils. Fl. Antarct.* 406. t. 152. f. 8;—*Fl. N. Z.* ii. 66. Stems forming large tufts, tall and robust. Leaves sub-

erect or falcate and subsecund, flexuous, long subulate-lanceolate, narrowed into very long almost capillary points, convolute below, spinulose-serrate above; nerve variable in width, well defined, excurrent; perichaetial longer, sheathing. Fruitstalk 1 inch long. Capsule cylindrical, inclined or nearly erect, substrumose; operculum with a long beak.

Var. *β. pungens*. Perichaetial leaves longer, capsule less curved.—*D. pungens*, Hook. f. and Wils. Fl. Antart. i. 129. t. 59. f. 1.

**Middle Island**: var. *β*, Jackson's Bay, *Lyall*. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (Norway, Australia, Tasmania, Chile.)

10. **D. fasciatum**, *Hedwig*;—*Fl. N. Z.* ii. 66. Stems stout, 1 in. high, covered with matted fibrils. Leaves glossy yellow-green, substriated, crowded, secund, subulate-lanceolate, channelled, acuminate, spinulose-serrate; nerve slender; perichaetial much longer, often overtopping the capsules, long-acuminate. Fruitstalks usually twin, very short. Capsule almost hidden, oblong, curved, substrumose; annulus 0; operculum with a long beak. Calyptra rough at the apex. Inflorescence monœcious or diœcious.

**Northern** and **Middle** Islands. Bay of Islands, *Sinclair, J. D. H.*; Auckland, *Jolliffe*; Otago, *Hector* and *Buchanan*. The figure of Hedwig is indifferent, and Wilson thinks may indicate a different species.

11. **D. Billardieri**, *Bridel*;—*Fl. N. Z.* ii. 66. Stems stout, forming large tufts, 2–4 in. high. Leaves  $\frac{1}{4}$  in. long, yellow-green, membranous, falcate, secund, ovate-lanceolate, acuminate, concave, not striated, serrulate towards the apex; nerve slender; perichaetial longer. Fruitstalks longer than the perichaetial leaves. Capsule subcylindrical, curved, strumose; operculum with a long beak.—Schwægr. Suppl. t. 121.

Var. *β. duriusculum*, Fl. Antart. i. 129. Stems short, fastigiately branched; leaves more rigid, nerve broader. Fruitstalk longer.

Abundant in all the islands, and as far south as **Campbell's** Island, on old trees, etc. Var. *β*, **Lord Auckland's** group and **Campbell's** Island. (Australia, Tasmania, S. America.)

12. **D. setosum**, *Hook. f. and Wils. Fl. Antart.* 129. t. 58. f. 5. n. 2;—*Fl. N. Z.* ii. 66. Stems densely tufted, short, brittle, 1–4 in. long, yellow, glossy, sparingly branched. Leaves  $\frac{1}{2}$  in. long, strict, suberect, crowded, fragile, very long lanceolate and setaceous, serrulate; nerve broad, excurrent in a long seta, occupying the whole of the middle of the leaf; perichaetial sheathing, short. Fruitstalk 1 in. long, stout. Capsule suberect, oblong, curved; operculum with the beak longer than the capsule. Calyptra pale-brown, red at the apex.

Var. *β. attenuatum*, Fl. Antart. l. c. f. 5. n. 2. Stems longer and branched.

**Northern** and **Middle** Islands, *Colenso*, etc., and Port Preservation, *Lyall*. **Lord Auckland's** and **Campbell's** Islands: *α* and *β*, on the ground and on roots of trees, etc., common, *J. D. H.* (Tasmania, Chile.)

13. **D. Menziesii**, *Taylor in Phytologist*, ii. 1094;—*Fl. Antart.* 128. t. 58. f. 4; *Fl. N. Z.* ii. 67. Stems tufted, rather slender, 1–2 in. long, covered with matted whitish fibrils. Leaves yellow-green, crowded, secund, rather rigid, straight when dry, subulate-lanceolate and serrulate at the base, narrowed into a very long straight setaceous point; nerve solid, very strong when dry; perichaetial shorter. Fruitstalk very short, hardly longer than the



leaves. Capsule oblong, suberect, substrumose; operculum with a beak as long as the capsule. Male inflorescence nestling amongst the fibrils of the stem. — *D. brachypelma*, C. Muell. in Bot. Zeit. 1851. 550.

Var. *β. rigidum*, Fl. N. Z. Stem stouter; leaves less crowded, more rigid, spreading, subfalcate.

Common throughout the islands and in **Lord Auckland's** group. (Tasmania, Australia, Polynesia, Chile.)

Of *D. dichotomum*, Bridel, said by Montagne in Voy. au Pôle Sud, 297, to have been brought by Hombron from **Lord Auckland's** group, I know nothing. It is a Bourbon species.

## 12. DICRANODONTIUM, Brid.

Erect, tufted, usually terrestrial, diœcious mosses. Leaves imbricating all round the stems, with broad sheathing bases and a broad nerve. Fruitstalk terminal, curved when moist. Capsule pendulous or decurved, owing to the curvature of the fruitstalk, equal or unequal, striate or plicate; teeth 16, linear-lanceolate, remotely articulate, 2-fid to below the middle or to the base, divisions unequal, subulate; annulus narrow, persistent. Operculum oblique, subulate. Calyptra cucullate, smooth, not fringed at the base.

A small genus, chiefly insular and tropical, similar in habit and characters to *Campylopus*, but differing from that genus in wanting the lamellate leaves and fringed base to the calyptra, and from *Dicranum* in the teeth and pendulous capsule. Mitten refers the species to *Leptotrichum*, Hampe.

Leaf suddenly contracted from a broad base . . . . . 1. *D. flexipes*.  
 Leaf linear-lanceolate . . . . . 2. *D. lineare*.

1. **D. flexipes**, Mitten, mss.—*D. proscriptum*, Fl. N. Z. ii. 67, not of Hornschuch. Stems slender, simple,  $\frac{1}{8}$  in. long. Leaves falcate, secund, yellow-green, brown when old, base sheathing, then rigid setaceous or capillary, quite entire or serrulate about the middle; nerve stout. Fruitstalk curved when moist, straight when dry. Capsule elliptic, substriate when dry; annulus large. Inflorescence diœcious.

Var. *β*. Taller; leaves lax, squarrose, broader and more sheathing below.

Var. *γ*. Stem short; leaves crowded, falcate.

**Northern** Island: Bay of Islands, etc., *J. D. H., Colenso*, etc. Mr. Mitten points out that this differs from the *D. proscriptum* of St. Helena in the gibbous capsule, small struma, and less suddenly subulate leaves.

2. **D. lineare**, Mitten, mss. Stems very short, tufted, less than  $\frac{1}{2}$  in. high. Leaves pale-green, soft, spreading, linear-lanceolate; nerve continuous, keeled; margins serrulate; perichætil elliptic-ovate, convolute. Fruitstalk as long as the perichætil leaves. Capsule curved, ovoid, subequal, subapophysate, with 8 furrows when dry; teeth slender, yellow, broad; operculum conic-subulate, half as long as the capsule. Inflorescence monœcious.

**Middle** Island: Canterbury, *Travers*. Distinguished from all others by the cauline leaves not subulate from dilated bases, by the minutely serrulate leaves and defined nerve. (*Mitten*).

## 13. CAMPYLOPUS, Bridel.

Tufted, erect, pale-green or yellowish, often shining, diœcious mosses;

stems simple. Leaves in interrupted tufts, usually piliferous, with very broad nerves, lamellated at the back. Fruitstalk terminal, arcuate, often clustered. Capsule often turned down or completely round and up again by the curving of the fruitstalk, ovoid, equal or strumose, striated; annulus double, coiling off; teeth of *Dicranum*. Operculum obliquely beaked. Calyptra cucullate, fringed at the base.

A large genus, especially common in tropical and southern mountains and oceanic islands, chiefly distinguished from *Dicranum* by the often interrupted piliferous leaves, the curious coil in the fruitstalks, and fringed calyptra. The species are often very difficult of discrimination, and the New Zealand ones are probably far from satisfactorily determined, owing to the want of good specimens, and different views of authors.

I. Leaves with white hair-like points.

a. Hair-like points reflexed . . . . . 1. *C. introflexus*.

β. Hair-like points straight.

Leaves appressed when dry, gradually narrowed from an elliptic base . . . . . 2. *C. appressifolius*.

Leaves lanceolate, suddenly narrowed into short points . . . 3. *C. clavatus*.

Leaves lanceolate, suddenly narrowed into long points . . . 4. *C. torquatus*.

II. Leaves without hair-like points . . . . . 5. *C. bicolor*.

1. ***C. introflexus***, Hedw. Sp. Musc. t. 29;—Fl. N. Z. ii. 69. Stems erect, branched, often proliferous and thickened at the ends. Leaves yellowish or yellow-brown or -green, densely imbricate, base broad, concave, lanceolate, sheathing, with a pellucid margin, suddenly contracted into a white, reflexed, toothed, hair-point; nerve broad, well defined below. Fruitstalks crowded, hidden amongst the perichæatial leaves. Capsule obovate, unequal, striated; operculum conical.—*C. xanthophyllus*, Moutagne; Fl. N. Z. ii. 68; *C. atro-virens*, De Notaris; Mont. in Voy. Pôle Sud; Bot. Crypt. 300?; *Dicranum leptocephalum*, C. Muell. in Bot. Zeit. 1851. 351.

Common throughout the islands and in **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (A common southern and northern species.)

2. ***C. appressifolius***, Mitten, mss.—*C. clavatus*, Fl. N. Z. ii. 62 (not of Brown). Stem 1–2 in. long, slender, simple, thickened above. Leaves dull green, appressed when dry, spreading when moist, gradually dilated from an elliptic-lanceolate base to an acuminate, hair-like, serrulate, hyaline point; marginal cells below forming a subquadrate brown area on each side (*Mitten*).

**Northern** Island: Mount Eden, near Auckland, *Jupp* (*Herb. Mitten*). **Middle** Island, *Lyall*, barren.

3. ***C. clavatus***, Brown in *Schwægrichen*, Suppl. t. 255 A;—Fl. N. Z. ii. 69, in part. Stems densely tufted, dichotomously branched; branches much thickened at the tips. Leaves golden-yellow, below lanceolate, suddenly acuminate into short, white, straight hair-points; nerve solid. Fruitstalk  $\frac{1}{4}$  in. long, red. Capsule pendulous or erect, striate.

**Northern** Island: Taranaki hills, *Jupp* (*Herb. Mitten*). **Middle** Island: Nelson, *Herb. A. Richard*; Dusky Bay, *Lyall*. I am indebted to Mitten for distinguishing this from the preceding. (Tasmania, Australia, St. Paul's Island.)

4. ***C. torquatus***, Mitten in Fl. Tasman. ii. 173.—*C. pallidus*, Hook. f. and Wils. Fl. N. Z. ii. 68. t. 84. f. 3, in part. Stems short, nearly simple. Leaves soft, pale green or whitish, of lax and spongy texture, crowded, sub-

erect; base ovate-lanceolate, narrowed into a long subulate, setaceous, white spinulous point; nerve very broad, spongy. Fruitstalks crowded, stout, spirally twisted. Capsule pyriform, pale, substance thick, grooved when dry; mouth purple; operculum small. Calyptra short.—*C. torfæus*, Mitt. in Hook. Kew Journ. Bot. 1856. 257; *Dicranum flexuosum*, C. Muell. in Bot. Zeit. 1851. 551.

**Northern** and **Middle** Islands: East Coast, *Colenso*; Kiapara, *Mossman*; Auckland, *Sinclair, Knight*; Hokianga, *Sinclair*; Otago, *Hector and Buchanan*. **Campbell's** Island, barren, *J. D. H.* (Tasmania.)

5. **C. bicolor**, *Hornschuch*;—*Fl. N. Z.* ii. 69. Stems densely tufted. Leaves crowded, lower black, upper glossy green, stout, subulate-lanceolate, obtuse, concave at the apex, without hair-points; nerve broad.

**Northern** Island, *Colenso*; Kiapara, *Mossman*. (Tasmania, Australia.)

#### 14. TREMATODON, Richard.

Usually short, tufted, annual, pale-green mosses, growing on earth. Leaves very slender. Fruitstalk terminal, flexuous or coiled. Capsule oblong, cernuous, with a long narrow neck (struma), annulate; teeth 16, in one row, subulate, transversely barred, 2-fid, often unequally, rough and granulated. Operculum long beaked. Calyptra cucullate, inflated.

A small genus, not rare in warm and temperate latitudes.

Capsule much shorter than its neck . . . . . 1. *T. suberectus*.

Capsule as long as its neck.

Capsule deflexed . . . . . 2. *T. arcuatus*.

Capsule suberect . . . . . 3. *T. flexipes*.

1. **T. suberectus**, *Mitten, mss.*—*T. longicollis*, *Fl. N. Z.* ii. 69 (not of Richard). Stems short, slender, erect, sparingly branched. Leaves pale green, subulate, with setaceous denticulate points, flexuous when dry; nerve stout; perichætil very long, also denticulate at the apex. Fruitstalk  $\frac{1}{2}$ — $\frac{3}{4}$  in. long. Capsule elongate, nearly erect, much shorter than the somewhat curved neck; operculum conical, beaked, as long as the capsule. Inflorescence diœcious.

**Northern** and **Middle** Islands: Bay of Islands, on clay banks, *J. D. H.*; Wellington, *Lyall*. *Mitten* distinguishes this from *T. longicollis* by the shorter neck of the capsule and inflorescence.

2. **T. arcuatus**, *Mitten, mss.* Very similar to *T. suberectus*, but the capsule is as long as its neck, and deflexed.

**Northern** Island: Wellington, *Stephenson*.

3. **T. flexipes**, *Mitten in Fl. Tasman.* ii. 173. *t.* 172. *f.* 6. Stems very short. Leaves erecto-patent, lanceolate-subulate, quite entire; nerve broad, occupying the whole upper three-fourths of the leaf. Fruitstalk short, flexuose. Capsule suberect, red-brown, as long as its neck; teeth red, cleft; operculum with a curved beak.

**Middle** Island: Otago, *Hector and Buchanan*. (Tasmania.)

15. **TRICHOSTOMUM**, Bridel.

Usually tufted, short, green, slender, monœcious or diœcious mosses, growing on earth or rocks. Leaves narrow; cells minute above, large at the base; nerve strong, continuous or excurrent. Fruitstalk terminal. Capsule long, erect; annulus present or absent; teeth 32, in one row, approximated in pairs, filiform (very short in *T. mutabile*), tetragonous, granulate, closely barred, twisted inwards. Operculum elongate, obliquely beaked. Calyptra cucullate.

A large genus, both tropical and temperate, very closely allied to *Tortula*, and often hardly distinguishable. The teeth sometimes appear as 16, simple or perforated.

I. **PILOPOGON**.—Leaves with a hair-point . . . . . 1. *T. leptodum*.

II. Leaves linear, ligulate or lanceolate.

Leaves crowded, linear-oblong, erect when dry; margin reflexed;

nerve vanishing . . . . . 2. *T. lingulatum*.

Leaves oblong-lanceolate, acute, concave at the apex; margin flat . . . . . 3. *T. phæum*.

Leaves linear-lanceolate; nerve excurrent; margin flat . . . . . 4. *T. mutabile*.

Leaves crowded, lanceolate, obtuse, concave at the tip; nerve excurrent; margins undulate . . . . . 5. *T. rubripes*.

III. Leaves broad and sheathing below, above subulate, setaceous.

Leaves flexuous, lower  $\frac{1}{3}$  ovate. Capsule oblong . . . . . 6. *T. laxifolium*.

Leaves spreading, lower  $\frac{1}{4}$  oblong. Capsule cylindric . . . . . 7. *T. elongatum*.

Leaves strict, lower  $\frac{1}{3}$  ovate-lanceolate, keeled . . . . . 8. *T. setosum*.

Leaves flexuous, lower  $\frac{1}{2}$  linear-oblong, upper part denticulate . . . . . 9. *T. australe*.

1. **T. (Pilopogon) leptodum**, *Mitten, mss.*—*Campylopus leptodus*, Montagne;—*Fl. N. Z.* ii. 68. Stems tufted, proliferous; branches fascicled. Leaves lanceolate-subulate, strict, with a short, white, toothed hair-point, upper recurved; nerve slender. Fruitstalks crowded, flexuous. Capsule oblong, straight, smooth; teeth divided nearly to the base, divisions very long and slender; operculum subulate.

**Northern** Island, *Colenso*, in various places; Auckland, *Knight*. (Habit of a *Campylopus*.)

2. **T. lingulatum**, *Hook. f. and Wils. Fl. N. Z.* ii. 71. *t.* 84. *f.* 4. Stems very short,  $\frac{1}{8}$  in. high. Leaves pale, spreading, crowded, rather flaccid, erect when dry, linear-oblong or ovate-ligulate, obtuse, keeled; margins slightly reflexed; nerve vanishing; cells rather large. Fruitstalks  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, pale. Capsule erect, cylindric; annulus 0; operculum conico-subulate.

Var.  $\beta$ . Leaves longer; capsule subcylindric; operculum longer, beaked.

**Northern** Island: Bay of Islands, *J. D. H.* Var.  $\beta$ . *Colenso*.

3. **T. phæum**, *Hook. f. and Wils. Fl. N. Z.* ii. 72. *t.* 84. *f.* 5. Stems very short, tufted  $\frac{1}{3}$  in. high. Leaves purplish-brown, erecto-patent, rather dense and rigid, opaque, crisped when dry, oblong-lanceolate, keeled, acute, concave at the apex; margin flat, entire, opaque; nerve continuous, pellucid. Fruitstalk stout,  $\frac{1}{3}$  in. long. Capsule large, erect, oblong, dark red; teeth imperfect, connected by a basal membrane, oblique.

**Northern** Island: shores of Lake Waihou, *Colenso*. Specimens insufficient.

4. **T. mutabile**, *Bruch*;—*Fl. N. Z.* ii. 72. Stems tufted. Leaves



bright green, spreading, crisped when dry, linear-lanceolate, mucronate, somewhat keeled, margins nearly flat; nerve excurrent. Fruitstalk  $\frac{1}{2}$  in. long, yellowish. Capsule ovoid; annulus 0; teeth variable, very short, unequal; operculum with a long beak.—Wils. Bryol. Brit. 112. t. 41.

**Northern Island, Colenso; Canterbury, Travers.** (Europe.)

Mr. Wilson remarks that this moss, which is usually found near the seacoast in Britain, is rare in fruit; and the often imperfect peristome renders it difficult to distinguish from *Gymnostomum tortile*. Mitten says of Mr. Travers's specimens, that the leaves are only half as wide as in the European specimens, gradually tapering, and the operculum in a young state exceeds the capsule; it may be a different species.

5. **T. rubripes, Mitten, mss.** Stem short. Leaves dense, spreading, lanceolate, obtuse, concave at the apex; nerve pale, excurrent; margins flexuous, quite entire, incurved above. Fruitstalk red, flexuous. Capsule cylindric, erect; teeth oblique, red, nodular, free to the base; operculum conical,  $\frac{1}{3}$  as long as the capsule. Inflorescence diœcious.—Mitten.

**New Zealand, Kerr** (in Herb. Mitten). Almost a *Tortula*, and closely resembling *T. Knightii*.

6. **T. laxifolium, Hook. f. and Wils. Fl. N. Z. ii. 72.** Stems very short,  $\frac{1}{4}$  in. long, simple. Leaves yellowish, distant, spreading, very long, setaceous-subulate, with an ovate sheathing base, flexuous, channelled, quite entire; nerve solid. Fruitstalk  $\frac{1}{2}$ –1 in. long, slender, red. Capsule suberect, oblong, rather oblique, gibbous, narrowed towards the mouth; annulus distinct; operculum conical and subulate. Inflorescence monœcious.—*Dicranum flexifolium*, Hook. Musc. Exot. t. 144.

**Northern Island:** Bay of Islands, clay-hills, *J. D. H., Colenso*; Auckland, *Bolton*. (Tasmania, S. Africa, and S. America.)

7. **T. elongatum, Hook. f. and Wils. in Fl. Tasman. ii. 176. t. 173, f. 1.** Stem  $\frac{3}{4}$ –1 in. long, simple, rigid. Leaves lax, spreading, subsecund, rather flexuous and rigid, lower portion broad, elliptic-oblong, membranous; margin pellucid, suddenly contracted to a long subulate keeled point three times as long; margin roughish or subserrate. Fruitstalk 1 in. long, reddish. Capsule pale brown, cylindric, elongate; annulus large; operculum conic-subulate, half as long as the capsule. Inflorescence monœcious.

**New Zealand** (Fl. Tasman.). (Tasmania.)

8. **T. setosum, Hook. f. and Wils. Fl. N. Z. ii. 73. t. 84. f. 6.** Stems short,  $\frac{1}{4}$ – $\frac{1}{2}$  in. high, simple. Leaves pale yellow-green, lower ones reddish, strict, erect, crowded, setaceo-subulate from an ovate-lanceolate sheathing base, entire, sharply keeled to the apex; nerve broad, continuous. Fruitstalk very slender,  $\frac{1}{2}$ –1 in. high, pale. Capsule oblong, oblique, mouth contracted; annulus distinct; operculum conical with a slender beak, half as long as the capsule. Inflorescence monœcious.—*Leptotrichum affine*, C. Mueller.

**Northern and Middle Islands:** Bay of Islands, etc., *J. D. H.; Colenso; Sinclair*; Auckland, *Knight*; Wellington, *Lyall*. (Australia, Chile.)

9. **T. australe, Mitten.**—*Leptotrichum*, Mitten in Linn. Soc. Journal iv. 66, Fl. Tasman. ii. 177; *T. longifolium*, Fl. N. Z. ii. 72. Stems elongate, branched, 1–4 in. high. Leaves lurid yellow-green, erecto-patent, strict,

lower half sheathing, linear-oblong, upper setaceous-subulate, denticulate; cells linear below, dense above; perichaetial elongate, convolute. Fruit-stalks  $\frac{1}{2}$  in. long, pale brown. Capsule ovoid, erect, brown; teeth short; operculum more than half as long as the capsule. Inflorescence monœcious, male terminal.—*Lophodon longifolius* and *Didymodon longifolius*, var. 3, Fl. Antarct. 408. t. 59. f. 2; *Trichostomum longifolium* and *Distichium capillaceum*, Fl. N. Z. ii. 72 and 73.

**Northern** Island: mountainous districts, *Colenso*; Wairarapa Valley, *Knight*. **Middle** Island: Otago, *Lyall*. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (Tasmania and Fuegia.)

Very imperfect specimens of a plant found with *T. lingulatum* at the Bay of Islands by myself, have been very doubtfully referred by Mr. Wilson to the European *T. strictum*, Bruch, (Fl. N. Z. ii. 72). The leaves are yellowish, strict, ovate-lanceolate, acuminate, mucronate by the thick excurrent nerve, erect or incurved when dry; the margin flat.

## 16. TORTULA, Schreber.

Tufted, green, yellowish or red-brown, usually short, annual or perennial monœcious or diœcious mosses, growing on the earth, sand, or stones, rarely on trees. Fruitstalk terminal. Capsule erect, oblong, annulate; teeth 32, very long, filiform, twisted to the left, uncoiling when moist, often united at the base into a long or short tube. Operculum conic, with an oblique, slender beak. Calyptra cucullate (mitriform in *Streptopogon*).

A very large genus, found in all parts of the world, and containing some of the most ubiquitous mosses.

### I. *Calyptra cucullate*. Nerve of the leaf produced into a white hair-like point.

- |   |                            |
|---|----------------------------|
| Leaves imbricate, concave; nerve proliferous . . . . .                      | 1. <i>T. chloronotos</i> . |
| Leaves spreading, concave; margin involute; nerve granular, green . . . . . | 2. <i>T. papillosa</i> .   |
| Leaves spreading; nerve red; margin revolute . . . . .                      | 3. <i>T. Muelleri</i> .    |

### II. *Calyptra cucullate*. Nerve of the leaf excurrent, not white at the apex.

#### a. Perichaetial leaves inconspicuous.

#### † Leaves serrulate or crenulate at the apex.

- |                            |                          |
|----------------------------|--------------------------|
| Nerve smooth . . . . .     | 4. <i>T. serrulata</i> . |
| Nerve rough, red . . . . . | 5. <i>T. rubra</i> .     |

#### †† Leaves quite entire.

- |  |                             |
|--|-----------------------------|
| Leaves lanceolate acuminate; margin revolute; nerve hardly excurrent . . . . .                 | 6. <i>T. torquata</i> .     |
| Leaves lanceolate acuminate; margin revolute; nerve excurrent . . . . .                        | 7. <i>T. crispifolia</i> .  |
| Leaves ligulate or lanceolate; nerve red; teeth scarcely twisted . . . . .                     | 8. <i>T. australasica</i> . |
| Leaves linear-lanceolate; nerve pellucid . . . . .   | 9. <i>T. Knightii</i> .     |
| β. Perichaetial leaves long and sheathing . . . . .  | 10. <i>T. calycina</i> .    |
| III. STREPTOPOGON. <i>Calyptra mitriform</i> . Leaves crisped, with pellucid margins . . . . . | 11. <i>T. mnioides</i> .    |

1. **T. chloronotos**, *Bridel, Bryol. Univ. t. 539*;—*Fl. N. Z. ii. 69*. Stem very short,  $\frac{1}{2}$  in. high, nearly simple. Leaves imbricate, broadly ovate, concave, piliferous; margin entire, recurved; nerve filamentous, and bearing cellular buds; cells opaque. Fruitstalk slender,  $\frac{1}{3}$  in. long. Capsule elliptic-oblong.

**Northern** Island, *Colenso*. (Europe.)

2. **T. papillosa**, *Wils. Bryol. Brit. 135. t. 44*. Stems short, tufted,

sparingly branched. Leaves dull green, spreading, erect when dry, obovate, subacute, very concave, with the margin flat, shortly hair-pointed, strongly involute when dry, papillose at the back, and on the thick, spongy gemmiparous nerve; cells lax and succulent.

**Northern** Island, *Sinclair* (swamps only). (Europe and various other countries.) I have taken the description from the 'Bryologia Britannica.'

3. **T. Muelleri**, *Br. and Schimp.*;—*Fl. N. Z.* ii. 70. Stems elongated, covered with root-fibres. Leaves crowded, erecto-patent, straight, imbricate when dry, oblong-oval, obtuse, concave: margin reflexed; nerve purple-red, excurrent into a roughish hair-point. Fruitstalk long, purplish. Capsule cylindric, curved. Inflorescence monœcious.—*T. Antarctica*, Hampe; *Syntrichia princeps*, De Notaris.

**Northern** and **Middle** Islands: not uncommon, from the Bay of Islands, *J. D. H.* to Otago, *Lindsay*. Mitten refers to this common species *T. cuspidata* and *rubella*, Hook. f. and Wils. *Fl. Tasman.* 11, 175, 176. t. 172. f. 9 and 10. (Generally diffused.)

4. **T. serrulata**, *Hook. and Grev. in Brewst. Journ. Sc.* i. 229. t. 12;—*Fl. N. Z.* ii. 70. Stems elongate, somewhat branched,  $\frac{1}{2}$  in. long. Leaves orange-brown or rusty, subsquarrose when dry, lanceolate, acuminate, keeled; margin reflexed below, flat above, serrulate towards the apex; nerve stout, subexcurrent; cells minute. Fruitstalk stout, twisted,  $\frac{1}{2}$  in. long. Capsule inclined, cylindrical.

**Northern** Island: shores of Lake Waikau, *Colenso*. (Fuegia.)

**T. rubra**, *Mitten mss.*—*T. robusta*,  $\beta$ , *Fl. Antarct.* 409. Stems  $\frac{1}{2}$ –2 in. high. Leaves at the apex of the stem, lower pale-red, upper greenish, crowded, spreading, oblong-lanceolate, broad at the base, gradually narrowed into an acute apex; margins recurved in the middle, crenate and serrulate at the apex; nerve red, scabrous at the back, excurrent. Fruitstalk red. Capsule cylindric.—Mitten.

**Middle** Island: Otago, *Hector and Buchanan*. (Falkland Islands, Australia). Distinguished from *T. Muelleri* by the serrulate leaves, and from *T. serrulata* by the scabrid nerve.

6. **T. torquata**, *Taylor*;—*Fl. N. Z.* ii. 70. Stem short, erect, tufted. Leaves crowded, erecto-patent, closely spirally twisted when dry, lanceolate, acuminate; margin quite entire, revolute; nerve stout, scarcely excurrent. Fruitstalk pale-red, slender, flexuose. Capsule erect, oblong-ovate.

**Northern** Island, *Colenso* (Aaustrialia, Tasmania). Closely allied to the European *T. unguiculata*.

7. **T. crispifolia**, *Mitten mss.* Stems 1 in. high. Leaves yellow-green, subcrisped when dry, spreading, lanceolate from a broad erect base, acuminate; margins recurved throughout; nerve concolorous, rather broad, excurrent into a pungent mucro. Fruitstalk red. Capsule cylindric-ovoid, oblique; teeth pale red and twisted; operculum half the length of the capsule.—Mitten.

**Middle** Island: Canterbury, *Sinclair and Haast*. Allied to the European *T. fallax*, but distinguished by the excurrent nerve.

8. **T. australasiæ**, *Hook. f. and Wils. Fl. N. Z.* ii. 70. Stem short,

simple,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long. Leaves reddish, spreading, subrecurved, twisted and crisped when dry, subligulate linear or lanceolate, acute or obtuse, keeled; margin subreflexed; nerve red, running to the apex; cells minute. Fruit-stalk slender.  $\frac{1}{3}$  in. long, red. Capsule cylindrical-ovoid; teeth oblique, but hardly twisted; operculum with a short beak. Inflorescence diœcious.—*Trichostomum*, Hook. and Grev. in Brewst. Journ. Sc. i. t. 12; *T. fuscescens*, Hook. f. and Wils. in Fl. N. Z. ii. 73. t. 85. f. 1; *Tortula rufiseta*, Taylor.

**Northern** Island: Bay of Islands, etc., *Colenso*, J. D. H. Generically intermediate between *Tortula* and *Didymodon*, and perhaps a form of *T. cœspitosa*. Mitten identifies *Trichostomum fuscescens* with it. (Tasmania, Australia.)

9. **T. Knightii**, Mitten in Fl. Tasman. ii. 174. t. 172. f. 11.—*T. cœspitosa*, var., Fl. N. Z. ii. 70. Stems  $\frac{1}{4}$ – $\frac{1}{3}$  in. high. Leaves pale yellow-green, spreading, crisped when dry, linear-lanceolate from an oblong broader transparent base, very acuminate; margins quite entire, undulate throughout; nerve slender, excurrent. Fruitstalk slender, pale. Capsule cylindric.

**Northern** Island: Bay of Islands, J. D. H., *Colenso*; Auckland, *Knight*. Very near the European *T. Northiana*. (Tasmania.)

10. **T. calycina**, *Schwægr. Suppl.* t. 119;—*Fl. N. Z.* ii. 70. Stems very short, somewhat branched. Leaves yellow-green, subundulate, crisped when dry, narrow oblong-lanceolate, acuminate; margin flat; nerve stout; cells small; perichætil long, sheathing. Fruitstalk  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, red, yellow above. Capsule small, elliptic-oblong, suberect; operculum with a very long slender beak.

**Northern** and **Middle** Islands: Bay of Islands, *Logan*, *Colenso*, J. D. H.; Auckland, *Knight*; Nelson, *Jolliffe*, *Travers*. Apparently near *T. flexuosa* (Hook. Musc. Exot. t. 125) of South Africa, which has more erect leaves, less undulated and broader below. (Australia, Tasmania.)

11. **T. (Streptopogon) mnioides**, *Schwæg.*:—*Fl. N. Z.* ii. 71. Leaves yellowish, crisped, of firm texture, spreading, loosely imbricate, undulate, ovate-lanceolate, acuminate; margins pellucid, often gemmiparous at the apex.

**Northern** Island, *Colenso* (scrap only). Doubtfully referred to the European moss; it appears also to be Tasmanian.

## 17. DIDYMODON, Bruch and Schimper.

Short, tufted, monœcious or diœcious (rarely hermaphrodite) mosses, usually growing on earth. Leaves with minute cells above, larger at the base; nerve strong. Fruitstalk terminal, very slender, sometimes appearing lateral from the growth of shoots above it. Capsule oblong, erect; annulus persistent or unrolling; teeth 16, short, linear-subulate, excessively slender and fugacious, entire 2-fid or perforated along the middle line, not united by a membrane. Operculum conical, obtusely beaked. Calyptra cucullate.

A considerable genus, in both tropical and temperate regions, scarcely distinguishable from *Trichostomum*, except by the very tender fugacious peristome.

- |  |                            |
|--|----------------------------|
| Leaves 3-farious, erect and subsecund when dry, quite entire . . . . .                 | 1. <i>D. papillatus</i> .  |
| Leaves with acute, recurved, squarrose apices, serrulate towards the apex . . . . .    | 2. <i>D. interruptus</i> . |
| Leaves twisted when dry, spreading, lanceolate, denticulate towards the apex . . . . . | 3. <i>D. erubescens</i> .  |



1. **D. papillatus**, *Hook. f. and Wils. Fl. N. Z.* ii. 73. t. 85. f. 2. Stems loosely tufted, 1 in. long, rigid, brittle, a little branched; branches filiform, erect. Leaves yellowish, 3-farious, spreading, recurved, erect when dry and subsecund, ovate-lanceolate, acuminate, keeled, entire, papillose on both surfaces; margin below recurved; nerve subsolid; perichætical convolute. Fruit-stalk pale,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Capsule erect, narrow-oblong, pale, contracted at the mouth; annulus small; teeth 16, irregular, cloven and anastomosing; operculum conical, subulate.—Mitten in *Journ. Linn. Soc.* iv. 70; *Zygodon tristichus*, C. Muell. in *Bot. Zeit.* 1852, 764.

**Northern** and **Middle** Islands: Bay of Islands, *J. D. H., Colenso* (barren); Nelson, *Jolliffe, Travers*; Otago, *Hector and Buchanan*. (Tasmania and South Africa.)

2. **D. interruptus**, *Mitten. mss.* Stems loosely tufted, 1– $\frac{1}{2}$  in. high, erect, often interrupted by innovations. Leaves pale yellow-green, with an erect subquadrate base, above lanceolate, acute, recurved, squarrose, keeled; margin crenulate or serrulate at the apex; nerve vanishing, papillose at the back; cells above minutely papillose.

HAB. New Zealand, *Kerr* (in *Herb. Mitten*), *Sinclair*.

3. **D. erubescens**, *Mitten mss.* Stems subsimple, tufted, 1 in. high and upwards, dull rusty-green. Leaves lax, twisted when dry, with a broad, erect, appressed base, then spreading, lanceolate, acute obtuse or with a recurved apiculus; margins recurved throughout their length, denticulate towards the apex; nerve obscure, percurrent, keeled. Fruitstalk  $\frac{1}{2}$  in. long, reddish. Capsule cylindric; teeth short, narrow, coherent at the base; annulus compound; operculum obliquely beaked,  $\frac{1}{3}$  as long as the capsule. Inflorescence monœcious. Antheridia amongst the upper longer leaves.—Mitten.

**Middle** Island: Otago, *Hector*.

## 18. DESMATODON, Bridel.

Small, tufted, perennial, green, monœcious mosses (male inflorescence axillary), usually growing on earth. Foliage of *Tortula*. Fruitstalk terminal. Capsule erect, cernuous or pendulous, with a short neck; annulus simple; teeth 16 (sometimes absent), in one row, granulated, remotely barred, 2-fid or 3-fid, divisions tetragonous, distantly articulate, joined by one or two bars, when moist erect, when dry incurved or convolute. Operculum obtusely beaked. Calyptra cucullate.

A small genus, intermediate between *Tortula* and *Trichostomum*, and perhaps eventually to be merged with these. I follow Wilson in keeping it distinct, though he says, that “when highly developed, the peristome is scarcely, if at all, distinguishable from *Tortula*.”

1. **D. nervosus**, *Bruch and Schimper*;—*Fl. N. Z.* ii. 71. Stems erect,  $\frac{1}{4}$  in. high. Leaves yellow-green, spreading, convolute when dry, ovate-oblong, apiculate, concave; margin reflexed; nerve stout, thickened upwards, excurrent. Fruitstalk  $\frac{1}{10}$ – $\frac{1}{4}$  in. long. Capsule ovoid, erect; teeth variable, unequal, sometimes twisted, sometimes absent; annulus 0; operculum conical, hardly beaked.—Wils. *Bryol. Brit.* 103. t. 20; *Trichostomum convolutum*, Bridel.

**Northern** Island, *Colenso*. (Europe, S. America, Tasmania.)

19. **DISTICHIMUM**, Br. and Schimp.

Stems tufted, erect, flexuose, beset with radicles, with shoots under each inflorescence. Leaves glossy, distichous or 3-ranked, with imbricate sheathing bases, setaceous, flexuose; nerve broad. Capsule erect or inclined, with a short tapering base; annulus of 2 rows of cells, spirally uncoiling; teeth 16, inserted below the orifice, free to the base, equidistant, linear or lanceolate, transversely barred, with the middle line entire perforated or cleft. Operculum conical, beaked. Calyptra cucullate.

A small genus of alpine European mosses.

1. **D. capillaceum**, Br. and Sch. Stems forming dense and wide-spreading tufts, 1-4 in. high. Leaves setaceous from a lanceolate sheathing base, quite entire. Capsule erect, ovoid-oblong or subcylindric; teeth narrow with distant articulations, irregularly 2-cleft.—Wils. Bryol. Brit. 104. t. 20 (not Fl. N. Z. ii. 73, which is *Trichostomum australe*).

**Middle** Island: Southern Alps, *Sinclair and Haast*. (Europe, Asia, N. Africa, N. America.)

20. **CERATODON**, Bridel.

Short, tufted, diœcious mosses, growing on earth, burnt wood, etc., foliage of *Trichostomum*. Fruitstalk terminal, very slender. Capsule suberect, narrow-oblong, curved, thick-walled, furrowed, angular when dry; teeth 16, lanceolate, split nearly to the base; joints prominent, distant in the upper part, close below, conniving when moist, spirally incurved when dry; annulus double, revolute. Operculum conical, beaked. Calyptra cucullate.

A small genus, some of the species of which are excessively widely distributed.

1. **C. purpureus**, Bridel;—Fl. N. Z. i. 178. Stems densely tufted, short, dichotomously branched. Leaves dull green, spreading, oblong-lanceolate, keeled, papillose on the back; margins recurved, somewhat twisted when dry; nerve strong, excurrent; perichætil larger, sheathing, acuminate. Fruitstalk purple. Capsule suberect, oblong, slightly incurved, striate, nearly horizontal when dry; teeth combined at the base, 2-fid, edges pale; operculum conic.—Wils. Bryol. Brit. 84. t. 20.

Abundant throughout the islands, as far south as **Campbell's** Island. (One of the commonest mosses in the world.)

21. **ENCALYPTA**, Schreber.

Short, densely tufted, green, monœcious or diœcious mosses, growing on stones, walls, and earth. Fruitstalk terminal. Capsule erect, cylindric; annulus single or 0; peristome 0 or simple or double; outer of 16 subulate teeth; inner a thin membrane produced into slender ciliæ. Operculum with a long beak. Calyptra large, campanulate, mitriform, much exceeding the capsule, tip subulate.

A considerable north temperate genus, rare in the tropics and southern hemispheres.

1. **E. australis**, Mitten in Fl. Tasman. ii. 182. Stems loosely tufted,

short. Leaves dull green, suberect, lower ligulate, upper oblong-spathulate, acute or rather obtuse; margin papillose; nerve percurrent, scabrous at the back below the tip. Fruitstalk  $\frac{1}{3}$ – $\frac{3}{4}$  in. long. Capsule cylindrical, smooth; peristome 0; operculum subulate, as long as the capsule. Calyptra smooth at the tip. Inflorescence monœcious.

**Northern** and **Middle** Islands, *Colenso*; Auckland, *Knight*; Banks's Peninsula, *Jolliffe*; Nelson, *Travers*, *Mantell*. Perhaps only a form of the European *E. vulgaris*. (Tasmania, Australia, Chiloe.)

## 22. HEDWIGIA, Ehrhart.

Loosely tufted, creeping or suberect, branched, monœcious mosses. Leaves imbricate, nerveless, concave, with diaphanous erose apices. Cells small, quadrate. Fruitstalk very short, terminal. Capsule incurved in the perichætium, globose; annulus and teeth 0. Operculum plano-convex. Calyptra small, conic, glabrous or hairy.

A small genus, native of both temperate hemispheres.

1. **H. ciliata**, *Ehr.*—Stems depressed, 1–2 in. long, forming loosely-tufted patches. Leaves dull, glaucous or yellowish, crowded, spreading, erect and imbricate when dry, ovate-lanceolate, with erose diaphanous points; margin recurved below, flattish above; perichætial larger, apices ciliate. Mouth of capsule dilated when dry.—*Wils. Bryol. Brit.* 146. t. 6.

**Middle** Island: Otago, *Hector and Buchanan*. (Europe, America, Tasmania.)

## 23. BRAUNIA, Schimper.

Loosely tufted, suberect, pinnately-branched, diœcious mosses. Leaves closely imbricated, concave, all but quite entire, with long flexuous hair-points. Cells small. Fruitstalk long, slender, on short lateral branchlets. Capsule globose, grooved; mouth large; annulus and teeth 0. Operculum convex, with a long slender beak. Calyptra small, cucullate, glabrous.

A small genus of chiefly southern mosses, found also in the mountains of the tropics.

1. **B. Humboldtii**, *Schimper*.—*Hedwigia*, Hook.;—*Fl. N. Z.* ii. 93.—Stems suberect, 2–6 in. high. Leaves obovate, somewhat contracted in the middle, acuminate, with long hair-points, coriaceous; perichætial larger, sheathing, reddish, glossy. Fruitstalk  $\frac{1}{3}$ – $\frac{1}{2}$  in. long. Male inflorescence axillary, abundant.—*Hedwigia*, Hook. *Mus. Exot.* t. 137; *Anæctangium*, *Fl. Antaret.* 135 and 415.

**Middle** Island, *Lyall*; Otago, *Hector and Buchanan*. **Lord Auckland's** group and **Campbell's** Island: abundant on moist rocks, *J. D. H.* (Australia, Tasmania, Andes, Fuegia.)

## 24. LEPTANGIUM, Montagne.

Minute tufted moss, growing in vegetable soil, having a succulent subterraneous stem, and very short branches. Leaves concave, nerveless; cells large, lax. Fruitstalk terminal, extremely short. Capsule almost sessile, globose, mouth dilated, peristome 0. Operculum conical. Calyptra minute, fugacious.

A very curious moss, also found in Australia, differing in its large lax cells from *Hedwigia* and *Anæctangium*.

1. **L. repens**, *Mitt. in Journ. Linn. Soc.* iv. 79.—*Anæctangium*, Hook. Musc. Exot. t. 106; Fl. N. Z. ii. 93.—Stems very minute,  $\frac{1}{8}$ – $\frac{1}{4}$  in. high; some barren, some fertile. Leaves on the barren stems spreading, nearly orbicular, apiculate; on the fertile larger, whitish, imbricating, ovate, narrowed into a slender acuminate point, quite entire. Capsule sunk amongst the perichætical leaves; mouth very wide, elosed by a horizontal membrane; spores very large. Calyptra conical, covering only the tip of the operculum. Inflorescence monœcious; male usually axillary below the female; antheridia with filiform paraphyses.—*Anictangium*, Wilson in Lond. Journ. Bot. 1846, 143. t. 4 a.

**Northern** Island: Raukawa range, *Colenso*. (Australia, Tasmania.)

## 25. GRIMMIA, *Ehrhart*.

Tufted monœcious or diœcious, perennial mosses, often very dark coloured, and forming hemispherical tufts on rocks, etc., rarely on the ground, occasionally aquatic. Leaves often piliferous, white and transparent at the apex. Fruitstalk terminal, usually short. Capsule ovoid or oblong, annulate or not; teeth 16, in one row, lanceolate, barred, perforate, entire or 2–3-fid, reflexed when dry. Operculum conical, convex or nipple-shaped. Calyptra mitri-form, oblique or lobed at the base, rarely cucullate.

A large genus, especially in temperate countries.

A. SCHISTIDIUM. Capsule on a very short fruitstalk, hidden amongst the leaves. Operculum falling away with the columella attached. Calyptra minute, just covering the operculum . . . . . 1. *G. apocarpa*.

B. GRIMMIA. Capsule on a short curved fruitstalk, exserted. Calyptra larger. Leaves oblong-lanceolate, terminated abruptly by a hair; nerve vanishing . . . 2. *G. pulvinata*.  
Leaves linear-lanceolate, with a white hair-point; nerve vanishing . . . 3. *G. trichophylla*.  
Leaves oblong-lanceolate, acuminate, hair-pointed; nerve percurrent . . . 4. *G. basaltica*.

1. **G. apocarpa**, *Hedwig*.—*Schistidium apocarpum*, Br. and Schimp.;—Fl. N. Z. i. 74. Nearly black; stems loosely tufted,  $\frac{1}{2}$ –3 in. long. Leaves erect, then spreading, ovate-lanceolate, apiculate or obtuse, margin reflexed; nerve disappearing below the transparent white tip; perichætical broader. Fruitstalk very short indeed. Capsule elliptic, sunk amongst the leaves, thick-walled; annulus 0; operculum very broad, falling away with the columella. Calyptra lobed, very small, capping the operculum only.—*Schistidium*, Wils. Bryol. Brit. 150. t. 13.

**Northern** and **Middle** Islands: stones in and close to water. Bay of Islands, banks of the Waitangi, *J. D. H.* Shores of Waikari Lake, *Colenso*; Nelson, *Travers*; Otago, *Hector* and *Buchanan*. (Australia, Tasmania, Kerguelen's Land, S. America, and throughout the northern hemisphere.)

2. **G. pulvinata**, *Smith*;—Fl. N. Z. ii. 75. Stems short, forming dense small hoary hemispherical tufts. Leaves spreading, oblong-lanceolate, keeled above, terminated by a white hair; margin entire, recurved; nerve vanishing. Fruitstalk short, decurved. Capsule turned downwards, ovoid,



8-furrowed; annulus large; operculum beaked. Calyptra mitriform. Inflorescence monœcious.—Wils. Bryol. Brit. 153. t. 13.

Var. *β. Africana*, Fl. N. Z. l. c.: smaller, capsule shorter, operculum conical mamillate, teeth very short.—*Fissidens pulvinatus*, *β.*, Hedwig. Sp. Musc. t. 40. *G. cygnicolla*, Taylor.

**Northern** and **Middle** Islands: var. *β.* on rocks, etc., *Colenso*; Auckland, *Knight*; Nelson, *Travers*. (South Africa, Australia, and Tasmania.)

3. *G. trichophylla*, *Greville*;—*Fl. N. Z.* ii. 75. Stems short, forming small lax tufts. Leaves yellow-green, linear-lanceolate, narrowed into a white diaphanous hair-point, flexuous, crisped when dry; nerve vanishing. Fruitstalks short, curved or decurved. Capsule pendulous, ovoid, striated, angular when dry; annulus broad; teeth 2-fid; operculum conical, beaked. Inflorescence diœcious.—Wils. Bryol. Brit. 156. t. 32.

**Middle** Island: on stones. Ship Cove and Port Cooper, *Lyall*; Otago, *Lindsay*, *Hector* and *Buchanan*. (North temperate zone, South America, Tasmania.)

4. *G. basaltica*, *Mitten*, *ms.* Forming small hemispherical hoary tufts. Leaves spreading, oblong-lanceolate, acuminate with a hyaline hair-point, keeled by the percurrent nerve; perichætal with a much longer hair-point. Fruitstalk curved. Capsule ovoid-globose, plicate when dry; teeth red, perforated, subentire, reflexed when dry; operculum short, conic, acuminate. Inflorescence monœcious.

**Middle** Island: basalt rocks near Dunedin, *Lindsay* (*Herb. Mitten*). Closely resembling *G. orbicularis*, B. and S., of Europe, but capsule more plaited, less contracted at the mouth, and teeth reflexed when dry (*Mitten*).

## 26. RACOMITRIUM, *Bridel*.

Loosely tufted, often hoary, grey, diœcious, perennial mosses, growing in rocks or on the ground; stems usually elongate, branched. Leaves keeled, margins recurved, tips often white and transparent, nerve vanishing; cells long and sinuous at the base, square above. Fruitstalk terminal, usually short. Capsule elliptic or oblong, smooth, mouth narrow, annulate; teeth 16, 2-3-fid; divisions short, linear-subulate, unequal and irregularly combined, or very long filiform and free to the base; operculum conical, and subulate. Calyptra conical or mitriform, tip solid subulate, papillose; base membranous, fringed.

A genus of which most of the species abound in alpine regions, where some form large hoary patches on the ground and on rocks.

I. DRYPTODON. Stems dichotomously branched, young shoots fastigate, unbranched. Leaves ovate-oblong. Fruitstalk very short. Operculum shorter than the capsule. Teeth 2-fid . . . . . 1. *R. crispulum*.  
Leaves ovate-lanceolate. Fruitstalk longer. Operculum acicular, as long as the capsule. Teeth entire . . . . . 2. *R. rupestre*.  
Leaves narrow-lanceolate. Operculum subulate, shorter than the capsule. Teeth cleft . . . . . 3. *R. protensum*.  
Leaves elliptic-lanceolate, 3-cariate, apiculate . . . . . 4. *R. ptychophyllum*.

II. RACOMITRIUM. Stems irregularly branched; branches with lateral branchlets; shoots not fastigate.

Leaves deeply plaited, ovate-lanceolate, acute . . . . . 5. *R. symphyodon*.

Leaves tortuous, lanceolate subulate, toothed, with diaphanous hair-points . . . . . 6. *R. lanuginosum*.

1. ***R. crispulum***, *Hook. f. and Wils.*;—*Fl. N. Z.* ii. 75.—*Dryptodon*, *Fl. Antart.* 124. t. 57. f. 9. Stems forming loose tufts, 1–1½ in. high, slender, branching. Leaves pale or dark lurid-green, erecto-patent and subrecurved, ovate-oblong, acuminate, keeled, margin entire, reflexed below; apex subdiaphanous; nerve percurrent; perichætal shorter, obtuse or acute. Fruit-stalk very short, pale, lateral by the growth of side-shoots. Capsule elliptic-oblong, erect or inclined; annulus distinct; teeth red, 2-fid, reflexed when dry; operculum conical, subulate, not half as long as the capsule. Calyptra mitriform, base torn and inflexed.

*a.* Leaves gradually attenuated; cells of upper portion rounded.

*β.* Leaves with a suboval base, obtuse and apiculate, *R. chlorocarpum*, *Mitten*, mss.

Var. *a.* **Campbell's** Island, *J. D. H.* Var. *β.* **Northern** Island: on alpine rocks, *Colenso*. *Mitten* distinguishes the Northern Island form as a species (*R. chlorocarpum*). (Tasmania, Kerguelen's Land.)

2. ***R. rupestre***, *Hook. f. and Wils.*;—*Fl. N. Z.* ii. 75.—*Dryptodon*, *Fl. Antart.* 402. t. 152. f. 1. Stems densely tufted, slender, 1–2 in. long. Leaves lurid-green, spreading, densely subspirally imbricate when dry, ovate-lanceolate or ovate acuminate; lower subsquarrose, upper recurved, keeled, margin subrecurved, when dry more or less incurved and twisted; nerve scarcely continuous, red; perichætal broader, elliptic-oblong, obtuse. Fruitstalk very short, twisted when dry. Capsule small, erect, elliptic-oblong, red-brown; mouth contracted; teeth red, spreading when dry; operculum with a very slender beak, nearly as long as the capsule.—? *R. convolutum*, *Montagne, Sylloge*, 37.

**Northern** Island: moist rocks on the mountains, *Colenso*; also found in Tasmania, Fuegia, and Kerguelen's Land.

3. ***R. protensum***, *Braun*;—*Fl. N. Z.* ii. 76. Stems loosely tufted. Leaves light green, spreading all round or subsecund, appressed when dry, rather rigid, elongate-lanceolate, not diaphanous at the summit; nerve strong, percurrent; perichætal somewhat sheathing. Fruitstalk pale, ½ in. long. Capsule subcylindric, pale brown, thin-walled; teeth long, irregularly split to the base; operculum usually as long as the capsule, beaked.—*Wils. Bryol. Brit.* 166. t. 45.

**Northern** Island: moist rocks in mountain regions, *Colenso*. (Europe, Fuegia.)

4. ***R. ptychophyllum***, *Mitten*, mss. Stems tufted, 2 in. high; branches numerous, fastigiate. Lower leaves brown, upper yellow, spreading, imbricate when dry, and forming cuspidate tips to the branches, elliptic-lanceolate, subobtuse, apiculate, the tip diaphanous, keeled with the percurrent nerve, and with two deep folds on each side; margins quite entire, reflexed; cells narrow.

**Middle** Island: Otago (*Lindsay in Herb. Mitten*). Resembling *R. protensum*, var. 3 of *Fl. Antart.*, from Kerguelen's Land, but distinguished by the folds of the leaf (*Mitten*).

5. ***R. symphiodon***, *Mitten in Fl. Tasman.* ii. 181. t. 173. f. 4.—*R. fasciculare*, *Bridel*, var.;—*Fl. N. Z.* ii. 76. Stems loosely tufted, slender, elongated; branches slender, subfascicled. Leaves spreading, subsecund, erect when dry, ovate-lanceolate, acuminate, with hyaline points, margin recurved below, quite entire; perichætal acute. Fruitstalk yellow, very short. Cap-

sule cylindric; mouth small; teeth short, with transverse connecting bars. —*R. fasciculare*, var. 2 and 3, Fl. Antarct. p. 402. *Grimmia emersa*, C. Muell. in Bot. Zeit. 1851, 562. *R. microcarpum*?, Mont. in Voy. au Pôle Sud, Bot. Crypt. p. 284.

**Northern and Middle Islands**: common on rocks on the mountains. (Tasmania, Fuegia.)

6. ***R. lanuginosum***, Bridel;—Fl. Antarct. i. 124;—Fl. N. Z. ii. 76. Stems elongate, loosely tufted, 2–12 in. long, branched. Leaves hoary, spreading, erecto-patent, lanceolate, acuminate, their apex hyaline toothed and granulate. Fruitstalk apparently lateral, short, erect, tubercled. Capsule minute, ovoid, pale brown; mouth small; walls thick; teeth 2-fid, divisions filiform; annulus large; operculum as long as the capsule, or longer. —Wils. Bryol. Brit. 169. t. 19.

Var. *pruinoseum*, Fl. N. Z. iii. 76. Leaves more hoary, the hyaline point longer, spinulose-serrate; teeth erect.

**Campbell's Island**: on rocks, J. D. H.—Var. *pruinoseum*, **Northern and Middle Islands**: rocks on the mountains, common, Colenso, Travers, Haast, Hector and Buchanan (not seen in fruit); the common form of this moss is abundant in the north and south temperate zones.

## 27. SCHLOTHEIMIA, Bridel.

Tufted, creeping, usually dark-coloured mosses, with erect short branches, growing in tufts on trees. Stems and branches red-brown or blackish below, yellow or greenish at the tips. Leaves imbricated all round, oblong; cells circular, opaque, punctiform. Fruitstalk terminal, long or short. Capsule erect, subcylindric, smooth or grooved, not annulate. Teeth in 2 rows; outer 16, in pairs, revolute; inner 16 or more, irregular, erect, conniving and forming a cone. Operculum conical, beaked. Calyptra conical or mitriform, rough at the tip, 4- or more lobed at the bottom; the lobes inflexed.

A considerable genus in the tropics and south temperate zone.

Leaves lingulate, shortly mucronate or not . . . . . 1. *S. Brownii*.

Leaves oblong-lanceolate, with a long mucro . . . . . 2. *S. Campbelliana*.

1. ***S. Brownii***, Schwægr. Suppl. ii. t. 167;—Fl. N. Z. ii. 77. Stems loosely tufted, slender,  $\frac{1}{2}$  in. long; branches nearly as high. Leaves dusky red-brown, lingulate, obtuse or somewhat cuspidate, lax, erecto-patent; twisted when dry; nerve narrow, scarcely excurrent. Fruitstalk very slender,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Capsule small, ovate-oblong, striated; inner peristome 32-parted; operculum very slender. Calyptra smooth.

**Northern Island**: Bay of Islands, J. D. H.; Port Nicholson, Lyall (not found in fruit). (Australia.)

2. ***S. campbelliana***, C. Muell. Synops. Musc. i. 753.—*S. quadrifida*, Fl. Antarct. i. 126. t. 58. f. 1, not of Bridel. Stems loosely tufted; branches  $\frac{1}{2}$ –1½ in. high, rather robust. Leaves red-brown, the upper green, spreading, twisted when dry, oblong-lanceolate, contracted in the middle, obtuse and emarginate or acute; nerve excurrent as a slender long mucro, concave, not striated. Fruitstalk stout,  $\frac{1}{4}$  in. high. Capsule cylindrical,

erect, or inclined; operculum conical, with a slender beak, half as long as the capsule. Calyptra smooth.

**Campbell's Island**: on trunks of trees and on rocks, *J. D. H.*

## 28. *MACROMITRIUM*, *Bridel*.

Densely tufted, usually brown or blackish mosses, with creeping stems and erect branches, often forming large patches on trees and rocks. Stems and branches often dark below and yellowish-green at the tips. Leaves rather or very opaque; cells very minute, circular. Fruitstalk terminal. Capsule ovoid, narrowed below, erect, equal, thick-walled; mouth often when dry contracted by 8 folds; annulus 0; peristome 0, or single or double; outer 16 flat lanceolate teeth, inserted in pairs below the mouth; inner a lacerated membrane. Operculum with a straight beak. Calyptra mitriform, glabrous or pilose, longitudinally folded or grooved, lacinate at the base.

A very large tropical and subtropical genus, of which many of the species are either variable or difficult of discrimination. Of the New Zealand ones here described, I suspect some will have to be united hereafter.

### I. *Calyptra glabrous*.

*Peristome double* . . . . . 1. *M. sulcatum*.

#### *Peristome single* (0? in *M. asperulum*).

##### a. *Leaves obtuse or acute, not mucronate* (see 8, *Hectori*.)

Leaves linear-lanceolate, acuminate. Fruitstalk very short . . . 2. *M. longirostre*.

Leaves linear-lanceolate, acute. Fruitstalk very long . . . 3. *M. longipes*.

##### β. *Leaves mucronate by the more or less excurrent nerve* (nerve vanishing in *M. Hectori*).

Margin of leaves rough, with prominent papillæ . . . . . 4. *M. asperulum*.

Stems slender. Leaves lanceolate-subulate, flexuous and twisted when dry . . . . . 5. *M. gracile*.

Leaves subcirrhose when dry, linear-ligulate, obtuse . . . . . 6. *M. ligulare*.

Leaves straight, both when dry and moist . . . . . 7. *M. orthophyllum*.

Leaves oblong-lanceolate, obtuse; nerve vanishing below the apex . 8. *M. Hectori*.

### II. *Calyptra pilose*. *Peristome single*.

##### a. *Leaves more or less lanceolate, acute or acuminate*.

Leaves spreading and recurved, subobtuse. Capsule ovoid-oblong, striate . . . . . 9. *M. recurvifolium*.

Leaves spreading and incurved, acuminate. Capsule urceolate, smooth . . . . . 10. *M. Mauritianum*?

Leaves spreading and recurved. Capsule subpyriform, slightly grooved . . . . . 11. *M. microphyllum*.

Leaves spreading, incurved, acute. Capsule ovoid, smooth . . . 12. *M. incurvifolium*.

##### β. *Leaves more or less ligulate, obtuse, apiculate or mucronate*.

Leaves spreading, subincurved; cells minute, dense. Capsule oblong; mouth plaited . . . . . 13. *M. hemitrichodes*.

Leaves spreading, subincurved; cells lax. Capsule oblong; mouth plaited . . . . . 14. *M. microstomum*.

Leaves erecto-patent; cells dense. Capsule ovoid . . . . . 15. *M. prorepens*.

Leaves spreading and incurved; margins erose; cells rather large . 16. *M. erosulum*.

γ. *Leaves ligulate, retuse or 2-lobed* . . . . . 17. *M. retusum*.

### III. *Calyptra unknown* . . . . . 18. *M. aristatum*.

1. *M. sulcatum*, *Bridel*;—*Fl. N. Z.* ii. 77. Branches very short.



Leaves spreading, crisped when dry, linear-lanceolate, acuminate, undulate, quite entire; nerve percurrent. Fruitstalks  $\frac{1}{4}$  in. long. Capsule ovoid, deeply grooved; outer teeth 16, linear, geminate; inner united into a membranous lacerate cone; operculum with a long straight beak. Calyptra glabrous, fimbriate to the middle.—*Schlottheimia*, Hook. Musc. Exot. t. 156.

Var.  $\beta$ . Leaves less acuminate, scarcely undulate; probably a different species.

Var.  $\beta$ . **Northern** Island, *Colenso*. A doubtful determination. The original plant is a native of Ceylon and Nepal.

2. **M. longirostre**, *Schwægr. Suppl. t. 112*;—*Fl. Antart. t. 126*;—*Fl. N. Z. ii. 78*.—Branches erect, 1 in. high, crowded. Leaves bright yellow-red or bronze, lower black, subrigid, crowded, erecto-patent, twisted when dry, linear-lanceolate, very acute, with 2 parallel lines one on each side the solid stout nerve, margins recurved; nerve reddish. Fruitstalk stout, rather short,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, black. Capsule sulcate, elongate, narrow, almost linear-oblong, gradually narrowed into the stout fruitstalk; peristome single; operculum with a slender straight beak. Calyptra glabrous, fimbriate halfway up.—*Orthotrichum*, Hook. Musc. Exot. t. 25.

Var.  $\beta$ . *acutifolium*, *Fl. N. Z. l. c.* Leaves more acuminate, with a subexcurrent nerve.—*Orthotrichum*, Hook. and Grev. in Brewst. Journ. l. c. t. 5; *Fl. Antart. l. c. i.* *M. Pacci-vanum*, De Notaris.

**Middle** Island: Dusky Bay, *Menzies*; Otago, *Hector and Buchanan*. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* **Chatham** Island, *Mr. Travers*.

Var.  $\beta$ . Port Preservation, *Lyall*. (Tasmania, Chiloe, a form.)

3. **M. longipes**, *Schwægr. Suppl. t. 139*;—*Fl. N. Z. ii. 78*. Branches elongate, erect, 1–1 $\frac{1}{2}$  in. high. Leaves dull yellow-green, reddish below, crowded, erecto-patent, crisped and twisted when dry, linear- or subulate-lanceolate, subacute, margin recurved, nerve pale. Fruitstalk very long, rarely short,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in., slender. Capsule elliptic; mouth contracted, plaited; peristome single; operculum very slender, straight. Calyptra glabrous.—*Orthotrichum*, Hook. Musc. Exot. t. 24.

Common throughout the **Northern** and **Middle** Islands, *Menzies*, etc. (Norfolk Island.)

4. **M. asperulum**, *Mitten in Fl. Tasman. ii. 376*.—*M. fimbriatum*, *Fl. N. Z. ii. 77*, not of Palisot. Stem slender, creeping; branches short, tufted. Leaves bright red-brown, dense, spreading, incurved when dry, ligulate from an oblong base, lower obtuse, upper acute, mucronate by the excurrent nerve, margins papillose and rough; perichætal shorter, acute. Fruitstalk  $\frac{1}{4}$  in. long. Capsule ovoid, attenuate below; peristome 0; mouth darker, plaited; operculum conical, acuminate. Calyptra naked. *M. microstomum*, *Fl. N. Z. ii. 79*, in part.

**Northern** and **Middle** Islands; common on trunks of trees, etc. (Tasmania.)

5. **M. gracile**, *Schwægr. Suppl. t. 112*;—*Fl. N. Z. ii. 78*. Stems flexuous, slender, sparingly branched, suberect, 1–2 in. long. Leaves pale yellow, brown below, brittle, spreading and incurved, flexuous and twisted when dry, lanceolate-subulate, cuspidate by the excurrent nerve. Fruitstalk  $\frac{1}{8}$ – $\frac{1}{4}$  in. long. Capsule ovoid, striate when dry; peristome single. Calyptra glabrous.—*M. Mossmanianum*, *C. Mnell. in Bot. Zeit. 1851, 561*. *Orthotrichum*, Hook. Musc. Exot. t. 27.

**Northern** and **Middle** Islands, probably common: Bay of Islands, *J. D. H.*; Dusky Bay, *Menzies*; Chalky Bay, *Lyall*; Nelson, *Travers*; Otago, *Hector and Buchanan*.

6. **M. ligulare**, *Mitten in Journ. Linn. Soc.* iv. 78;—Habit of *M. prorepens*. Leaves spreading, when dry crisped, twisted, and subcirrhose, linear-ligulate, obtuse, or shortly apiculate with the excurrent nerve, margin sub-erose; perichæatial shorter, ovate, acute. Fruitstalk  $\frac{1}{4}$  in. long, ovoid; mouth darker, plicate; teeth short; operculum conical, acuminate. Calyptra naked.

**Northern** Island: Waikēhi, *Sinclair*; *Kerr (in Herb. Mitten)*.

7. **M. orthophyllum**, *Mitten in Journ. Linn. Soc.* iv. 79. Habit, size, and colour of *M. longirostre*. Leaves spreading when moist, appressed when dry, striate in both cases, broadly lanceolate, keeled and shortly apiculate with the excurrent nerve; perichæatial longer, broader, more erect, with longer points. Fruitstalk  $\frac{1}{2}$  in. long. Capsule ovoid, attenuate at the base; mouth plicate; teeth short, free; operculum subulate, as long as the capsule. Calyptra glabrous.

**Northern** Island, *Kerr (in Herb. Mitten)*; Auckland, *Knight*.

8. **M. Hectorsi**, *Mitten, mss.* Branches erect, divided. Leaves brown, almost shining, dense, spreading, scarcely twisted when dry, oblong-lanceolate, obtuse, apiculate, flat or waved, keeled; nerve vanishing below the apex; lower cells elongate, papillose; perichæatial similar. Fruitstalk slender. Capsule fusiform, with a slender neck, plaited; teeth granular, cohering at the base; operculum long, subulate. Calyptra long, naked.

**Middle** Island: Otago, *Hector and Buchanan*.

9. **M. recurvifolium**, *Bridel*;—*Fl. N. Z.* ii. 78. Stems 1–2 in. long, creeping, rather slender. Leaves pale yellow-brown, widely spreading, or recurved when moist, spirally twisted when dry, subulate-lanceolate, rather obtuse, fragile; nerve pale, continuous; cells small, dense, opaque. Fruitstalk  $\frac{1}{10}$ – $\frac{1}{8}$  in. long, slender. Capsule oblong-ovoid, slightly grooved.—*Orthotrichum*, *Hook. and Grev. in Brewst. Journ. Science*, i. 120. t. 5.

**Northern** Island: Bay of Islands, *Logan, J. D. H., Colenso, Kerr (in Herb. Mitten)*. (Java.)

10. **M. Mauritianum**? *Schwægr. Suppl. t.* 189;—*Fl. N. Z.* ii. 79. Stems long, creeping; branches short or long. Leaves dense, yellow-green, spreading and incurved when moist, much crisped and twisted together when dry, lanceolate, acuminate; nerve stout, pale; cells dense, small. Fruitstalk short. Capsule urceolate, smooth. Calyptra slightly hairy.

**Northern** Island: Bay of Islands, *Logan*. A doubtful plant; the original is stated to be a native of Mauritius, Java, and Australia.

11. **M. microphyllum**, *Hook. and Grev.*;—*Fl. N. Z.* ii. 80. Stems and branches very slender, 1–2 in. long,  $\frac{1}{20}$  in. diam. Leaves yellow-brown, loosely spreading and recurved when moist, striate and appressed when dry, ovate- or subulate-lanceolate, acute, keeled, with 2 striæ at the base, pellucid, more or less papillose above; nerve stout, vanishing below the tip; cells minute. Fruitstalk very slender,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long. Capsule oval-oblong or sub-

pyriform, slightly grooved; peristome very short, undivided. Calyptra hairy.—*M. barbatum*, Mitten, mss.; *Orthotrichum*, Hook. and Grev. in Brewst. Journ. Sc. i. t. 6.

**Northern** and **Middle** Islands: East Coast, *Colenso*; Auckland, *Knight*; Port Nicholson, *Lyall*; Nelson, *Travers*; Otago, *Hector and Buchanan*. (Australia, Tasmania, and S. Africa.)

12. **M. incurvifolium**, *Schwægr. Suppl.*;—*Fl. N. Z.* ii. 79. Stem creeping. Leaves spreading and incurved when moist, crisped when dry, subulate-lanceolate, subacute, keeled, incurved at the tip. Capsule ovate, smooth; operculum acicular, straight. Calyptra laminate, pilose.—*Orthotrichum*, Hook. and Grev. in Brewst. Ed. Journ. i. 117. t. 4.

**Middle** Island: Dusky Bay, *Menzies*. (Doubtful.)

Mr. Wilson suspects some mistake in the habitat of this moss, which, though a native of Australia and the Pacific Islands, has not been found in New Zealand, except by *Menzies*.

13. **M. hemitrichodes**, *Schwægr. Suppl. t.* 193;—*Fl. N. Z.* ii. 79. Stems long, creeping, 3–4 in. long, rather stout; branches  $\frac{1}{2}$  in. high. Leaves dark green, lower brown, spreading and subincurved when moist, crisp when dry, ligulate-lanceolate, obtuse, apiculate; margin recurved below; nerve stout, concolorous; cells very minute, dense, opaque. Fruitstalk  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, slender. Capsule ovoid or subcylindric, smooth; plaited at the mouth. Calyptra somewhat hairy.

**Northern** Island, *Logan*. (Australia.)

14. **M. microstomum**, *Schwægr. Suppl., not of Fl. N. Z.* ii. 79. Stems and branches elongate, strict, branched at the apex. Leaves brownish-green, spreading and spirally twisted when moist, crisped when dry, ligulate-lanceolate, obtuse, apiculate, papillose; nerve reddish; cells lax, larger than in its allies, roundish. Capsule ovoid, smooth, plaited at the contracted mouth; peristome single; teeth narrow, geminate, trabeculate, white. Calyptra glabrous.—*Orthotrichum*, Hook. and Grev. in Brewst. Journ. Sc. i. t. 4.

**Northern** Island: Wellington, *Stephenson*. Nelson, *Travers*. (Tasmania.) Mitten refers the 'New Zealand Flora' plant of this name to *M. erosulum* and *asperulum*.

15. **M. prorepens**, *Schwægr. Suppl. ii. t.* 171;—*Fl. N. Z.* ii. 79. Stems 1–3 in. long; branches short, erect, simple. Leaves yellow-brown, erecto-patent when moist, scarcely crisped when dry, ligulate-lanceolate, obtuse, apiculate, keeled, scarcely papillose; cells small. Fruitstalk very slender,  $\frac{1}{6}$ – $\frac{1}{10}$  in. long. Capsule ovoid; mouth somewhat plaited. Calyptra pilose. Inflorescence monœcious.—*Orthotrichum*, Hook. Musc. Exot. t. 120.

**Northern** and **Middle** Islands: Waikahi, *Sinclair*; Dusky Bay, *Menzies*; Milford Sound, *Lyall*; Nelson, *Travers*; Otago, *Hector and Buchanan*.

16. **M. erosulum**, *Mitten in Journ. Linn. Soc.* iv. 78. Habit, size, and colour of *M. prorepens*. Leaves spreading when dry, compactly crisped and incurved, ligulate from an oblong base, keeled, mucronate; nerve yellow-brown, excurrent; lower cells narrow, upper papillose; perichaetial broader, acute. Fruitstalk about  $\frac{1}{4}$  in. long. Capsule ovoid, brown; mouth darker, plaited. Operculum subulate, as long as the capsule; teeth short. Calyptra pilose. *M. microstomum*, *Fl. N. Z.* ii. 79, in part.

**Northern** and **Middle** Islands: probably common.

17. **M. retusum**, *Hook. f. and Wils. Fl. N. Z. ii.* 79. t. 85. f. 6. Stems tufted, creeping; branches  $\frac{1}{2}$  in. long. Leaves pale yellow-green, crowded, erecto-patent and recurved when moist, crisped when dry, ligulate-oblong, retuse and 2-fid at the apex, scarcely keeled; nerve pale; cells very minute, opaque. Fruit unknown.

**Northern** Island: habitat unknown, *Colenso*. Kiapara?, *Ker* in Herb. Mitten.

18. **M. aristatum**, *Mitten, mss.* Small; branches short. Leaves greenish-brown, spreading, contracted when dry, broadly lanceolate, obtuse, with a subpiliferous apex, keeled; nerve vanishing below the apex; basal cells shortly oblong; upper scarcely papillose.—Mitten.

**Northern** Island: Auckland, *Knight*; specimen very small, and without fruit.

*M. piliferum*, *Schwægr.*, a Sandwich Island plant, occurs in Mr. Menzies' collection, but has been found by no one else, and as the habitats of several of that eminent collector's plants were confounded, it is most probable that this is one such; it may be known by its spreading lanceolate-subulate leaves, with long hair-points.

*M. Tongense*, *Sullivant*, Mosses of the U. S. Expl. Exped. 7. t. 5 (*M. abbreviatum*, *Mitten, mss.*), is unknown to me.

## 29. ORTHOTRICHUM, Hedwig.

Densely tufted, bright or dark green, short-stemmed mosses, often forming small cushions on trees and rocks, rarely on earth, sometimes creeping. Fruitstalk terminal. Capsule erect, pyriform; neck more or less elongate, striate, ribbed when dry; annulus 0; peristome 0, single or double; outer 16 teeth mostly united in pairs and inserted below the mouth; inner 8–16 cilia. Operculum with a conical beak. Calyptra large, inflated, campanulate, plicate, often pilose; base crenate or lacerate.

A large European and north temperate genus, rare in the tropics.

### *Peristome double.*

Leaves spreading, subacute. Capsule immersed . . . . .	1. <i>O. calvum</i> .
Leaves spreading, subacute. Capsule exserted . . . . .	2. <i>O. pumilum</i> .
Leaves spreading, erose. Capsule exserted . . . . .	3. <i>O. luteum</i> .

### *Peristome single (BRACHYSTELEUM).*

Leaves erecto-patent, oblong below, narrow above, obtuse . . . . .	4. <i>O. crassifolium</i> .
Leaves suberect, subulate, acuminate . . . . .	5. <i>O. angustifolium</i> .

1. **O. calvum**, *Hook. f. and Wils.*;—*Fl. N. Z. ii.* 8. t. 85. f. 7. Stems tufted, short, slender. Leaves dull green, spreading and rather recurved when moist, suberect when dry, oblong-lanceolate or ovate-oblong below, and more linear above, subacute; nerve solid; cells opaque. Fruitstalk  $\frac{1}{2}$  in. long. Capsule about as long as the fruitstalk, minute, elliptic-oblong or clavate, striate; inner peristome of 8 cilia; operculum not seen. Calyptra yellow-brown, glabrous.

**Northern** Island: Manawata, on branches, *Colenso*.

2. **O. pumilum**, *Dickson*;—*Fl. N. Z. ii.* 80. Stems short, tufted,  $\frac{1}{4}$  in. high. Leaves spreading when moist, appressed when dry, lanceolate, subacute, concave; margin revolute; nerve vanishing below the apex. Fruitstalk very short. Capsule sunk amongst the leaves, ovoid, with a short neck, broadly striate; operculum conical, short. Calyptra naked.—*Wils. Bryol. Brit.* 178. t. 45; *Schwægr. Suppl.* t. 50.



**Northern Island**: Cliffs at Hawke's Bay, *Colenso*. A European plant, of which I have very imperfect New Zealand specimens.

3. **O. luteum**, *Mitten in Fl. Tasman.* ii. 184. Stems densely tufted,  $\frac{1}{4}$  in. high. Leaves pale yellow, spreading when moist, crisped when dry, oblong and concave below, above linear-lanceolate, keeled; nerve yellow, vanishing below the apex; margins erose, recurved about the middle; perichætil longer, lanceolate. Fruitstalk  $\frac{1}{8}$  in. long. Capsule cylindric-oblong, plicate; neck thickened; inner peristome of 8 cilia; operculum with a short beak. Calyptra pilose.—*Uloa lutea*, *Mitten in Journ. Linn. Soc.* iv. 77.

**Northern Island**: Kaipara Mossman, *Mitten*. (Tasmania.)

4. **O. crassifolium**, *Hook. f. and Wils. Fl. Antarct.* 125. t. 57. f. 8. Stems very short, tufted,  $\frac{1}{4}$ – $\frac{1}{3}$  in. high. Leaves dirty olive-green, erecto-patent when moist and dry (then horny), coriaceous, ovate or oblong and concave below, linear or ligulate above, obtuse; margin recurved; nerve stout, vanishing below the apex, upper leaves narrower above and broader at the base. Fruitstalk very short. Capsule exserted or immersed, pyriform, smooth; neck very short; peristome single, yellow; operculum convex with a short straight beak. Calyptra plaited, glabrous, 8-fid at the base.

**Lord Auckland's** group and **Campbell's** Island: on rocks and stones, near high-water mark, *J. D. H.* (Kerguelen's Land, *Fuegia*.)

5. **O. angustifolium**, *Hook. f. and Wils. Fl. Antarct.* 125. t. 57. f. 7. Stems very short, tufted,  $\frac{1}{4}$ – $\frac{1}{3}$  in. high. Leaves black-green, crowded, suberect both when moist and dry, strict, thick in texture, subulate-lanceolate, acuminate; nerve thick, continuous; perichætil longer, subsecund. Fruitstalk very short. Capsule immersed, small, elliptic-ovoid; mouth rather large; peristome single; operculum convex with a short beak. Calyptra not seen.

**Campbell's** Island: on rocks, on the hills, *J. D. H.*

### 30. ZYGODON, Hook.

Tufted, small, usually bright green, monœcious, diœcious, or hermaphrodite mosses, often creeping, growing on trees, rarely on the ground. Leaves lanceolate or oblong, keeled; margin plane; cells minute. Fruitstalk terminal. Capsule erect, pyriform or clavate, grooved or striate; annulus 0; peristome 0 or single or double; outer 16 flat teeth united in pairs, reflexed when dry; inner 8–16 linear hyaline cilia alternating with the outer, sometimes conniving and forming a campanulate cone. Operculum obliquely beaked. Calyptra oblique, cucullate.

\* Inner teeth horizontal, free at the base.

a. Leaves with margins entire or nearly so.

† Peristome double.

Leaves erecto-patent, ligulate, obtuse. . . . . 1. *Z. obtusifolius*.

Leaves spreading, squarrose, oblong, acute . . . . . 2. *Z. Brownii*.

†† Peristome single or 0.

Leaves suberect, lingulate, subacute . . . . . 3. *Z. intermedius*.

Leaves spreading, oblong-lanceolate . . . . . 4. *Z. Reinwardtii*.

*β. Leaves with the margins denticulate.*

Leaves spreading, subincurved. Capsule immersed . . . . . 5. *Z. cyathicarpus*.

**\*\* Inner teeth conniving in a bell-shaped cone, united by a very short membrane at the base (Codonoblepharum, Schwægrichen).**

Leaves suberect, lingulate, apiculate . . . . . 6. *Z. Menziesii*.

1. ***Z. obtusifolius*, Hook. Musc. Exot. t. 159;—*Fl. N. Z.* ii. 80.** Stems tufted,  $\frac{1}{3}$  in. high. Leaves dull green, loosely erecto-patent, ligulate, obtuse. Fruitstalk  $\frac{1}{8}$ – $\frac{1}{10}$  in. long. Capsule deeply furrowed, 8-ribbed; peristome double; inner of 8 cilia; operculum with an inclined beak,  $\frac{1}{4}$  as long as the capsule. Calyptra roughish above, subpiculate below. Inflorescence monœcious.—Schwægr. Suppl. t. 136.

**Northern Island:** Bay of Islands, *J. D. H., Colenso*. (East Indies.)

2. ***Z. intermedius*, Bruch and Schimper;—*Fl. N. Z.* ii. 80.** Stems loosely tufted, slender,  $\frac{1}{2}$ –1 in. high, branching. Leaves pale yellow-green, lax, erecto-patent, lanceolate-lingulate, subacute, or oblong-lanceolate; margins plane; nerve ceasing below the apex. Fruitstalk  $\frac{1}{8}$ – $\frac{1}{4}$  in. long. Capsule oblong, deeply grooved; more than half as long as the capsule; peristome single, outer absent, inner of 8 cilia; operculum with a slender inclined beak. Inflorescence diœcious.—*Z. conoideus*, *β*, Hook. and Grev. in Brewst. Journ. Sc. i. 132.

**Middle Island:** Dusky Bay, *Menzies*. (Tasmania, Australia, Chili.)

3. ***Z. Brownii*, Schwægr. Suppl. t. 317 b;—*Fl. N. Z.* ii. 81.** Stems tufted, branched,  $\frac{1}{2}$ –1 in. high. Leaves pale green, spreading, recurved and squarrose, oblong, acute; nerve continuous and excurrent. Fruitstalk very slender,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long. Capsule pyriform, furrowed; peristome double; outer often rudimentary or irregular; inner of 8 cilia. Inflorescence diœcious.

Throughout the **Northern** and **Middle** Islands: common. (Australia, Tasmania.)

4. ***Z. Reinwardtii*, Braun;—*Fl. N. Z.* ii. 81.** Stems short,  $\frac{1}{2}$ – $\frac{1}{3}$  in. high. Leaves yellow-green, spreading, oblong-lanceolate; margins wavy, minutely denticulate, keeled; nerve excurrent; perichaetial shorter. Fruitstalk erect, flexuous,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long. Capsule subpyriform, sulcate; peristome fugacious or absent (?) in the New Zealand form; operculum conic, beaked. Calyptra large, substrate, coriaceous. Inflorescence hermaphrodite.—Schwægr. Suppl. t. 312 a. *Zygodon denticulatus*, Tayl. in Lond. Journ. Bot. vi. 329. *Z. anomalus*, Dozy and Molkb.; *Fl. Tasman.* ii. 185.

**Northern** and **Middle** Islands: Port Nicholson, *Sinclair*; Ruahine mountains, *Colenso*; Southern Alps, *Haast*; Otago, *Hector* and *Buchanan*. (Tasmania, Java, S. America.) Inner peristome, in Java specimens, of 16 cilia; outer present and fugacious in the Tasmanian.

5. ***Z. cyathicarpus*, Montagne, Flor. Chili Crypt. 132. t. 3;—*Fl. N. Z.* ii. 81.** Stems  $\frac{1}{2}$ –1 in. high, tufted, rather stout. Leaves pale green, spreading, subrecurved, crisped when dry, linear-lanceolate, acute, keeled, remotely denticulate; perichaetial overtopping the capsule. Fruitstalk very short. Capsule immersed, striate; peristome 0; operculum convex, with a short oblique beak. Inflorescence monœcious.—*Gymnostomum linearifolium*,

Tayl. in Lond. Journ. Bot. v. 42. *Didymodon cyathicarpus*, Mitten in Journ. Linn. Soc. iv. 70.

**Northern** Island: Makororo river, *Colenso*, with *Bartramia uncinata*. (North America, South Africa, Tasmania.) Mitten regards this as a Weissioid moss.

6. **Z. Menziesii**, *Mitten in Journ. Linn. Soc.* iv. 74. Stems tufted, densely fastigiately branched,  $\frac{1}{4}$  in. high. Leaves crowded, suberect, yellow-brown when old, lingulate, apiculate, keeled; nerve nearly continuous, strong, reddish, vanishing below the apex. Fruitstalk  $\frac{1}{10}$  in. long, slender. Capsule pyriform, pale, strongly grooved, contracted below the mouth; peristome double; inner of 16 cilia, conniving and forming a campanulate cone; operculum convex, obliquely beaked. Inflorescence diœcious.—*Codonoblepharum*, Schwægr. Suppl. ii. t. 137; Fl. Tasman. ii. 186.

**Northern** and **Middle** Islands: on bark of trees, *Colenso*. **Middle** Island: Dusky Bay, *Menzies*. (Tasmania, Australia.)

### 31. LEPTOSTOMUM, Br.

Densely-tufted, erect, bright green, soft, diœcious mosses, with matted, brown rootlets on the bases of the stems. Leaves piliferous, transparent; nerve stout; cells circular. Fruitstalk terminal, long. Capsule erect or pendulous, pyriform or clavate; annulus usually 0; peristome a membranous ring, more or less cleft, arising from the inner wall of the capsule. Operculum very short, conic. Calyptra cucullate, fugacious.

A genus of beautiful mosses, all natives of the southern temperate hemisphere, and growing on trunks of trees and rocks.

\* *Capsule narrowed into the fruitstalk.*

Capsule erect or inclined; hair-point of leaf straight . . . . . 1. *L. gracile*.  
Capsule inclined; hair-point flexuous . . . . . 2. *L. inclinans*.

\*\* *Capsule erect, not narrowed below.*

Capsule large, hair-point branched . . . . . 3. *L. macrocarpum*.

1. **L. gracile**, *Brown*;—*Fl. N. Z.* ii. 82. Stems densely tufted, 2–3 in. high. Leaves bright green, erect, crowded, closely imbricate when dry, lower ovate-lanceolate, upper oblong, all with a straight hair-point; margin reflexed; nerve stout. Fruitstalk 1–2 in. long. Capsule oblong, erect or inclined, subclavate; peristome a membranous white ring, with 16 2-fid divisions; annulus obscure; operculum hemispherical.—*Fl. Antarct.* i. 122; Schwægr. Suppl. t. 104. *Gymnostomum*, Hook. Musc. Exot. t. 22.

Throughout the **Northern** and **Middle** Islands, *Menzies*, etc. **Campbell's** Island: barren, *J. D. H.*

2. **L. inclinans**, *Brown*;—*Fl. N. Z.* ii. 82. Stems densely tufted. Leaves bright green, erecto-patent, loosely imbricate, erect when dry, ovate-oblong, obtuse, with a flexuous long hair-point, which is toothed at the tip; margin recurved; nerve stout, pale. Fruitstalk slender. Capsule inclined, obvoid-clavate, pale; peristome as in *L. gracile*; operculum conical-hemispheric.—Schwægr. Suppl. t. 213.—*Gymnostomum*, Hook. Musc. Exot. t. 168. *L. flexipile*, C. Mueller in Bot. Zeit. 1851, 547.

**Northern** Island: damp woods, Ruahamanga river, etc., *Colenso*.

3. **L. macrocarpum**, *Brown*;—*Fl. N. Z.* ii. 82. Stems  $\frac{1}{2}$  in. high. Leaves bright green, elliptic- or obovate-oblong, obtuse, with a branched hair-point, concave; margin recurved; nerve slender. Fruitstalk very long. Capsule large, erect, ovate-oblong, not narrowed at the base; mouth small; peristome very small; operculum conical obtuse.—*Bryum*, Hedwig, *Musc. Frond.* iii. t. 10.

Abundant on rocks and trunks of trees throughout the **Northern** and **Middle** Islands. One of the handsomest New Zealand mosses.

### 32. AULACOMNIUM, Schwægr.

Tufted, perennial, erect mosses, usually growing in marshy places; stems tomentose with radicles. Leaves variable; cells roundish. Fruitstalk terminal, long, flexuous. Capsule erect or cernuous, furrowed when dry, with a slender struma; annulus compound; peristome double; outer teeth 16, equidistant, incurved when dry, closely trabeculate; inner a pellucid membrane, divided into 16 perforated processes, with interposed cilia. Operculum convex, obtusely beaked. Calyptra small, cucullate, smooth.

A small European genus.

1. **A. Gaudichaudii**, *Mitten in Hook. Kew Journ.* 1856, 262. Stems erect, branched. Leaves long, erecto-patent, oblong, cuspidate by the excurrent nerve, strongly toothed; perichætil longer and narrower. Capsule narrow, erect, cylindrical, plaited when dry; annulus large, adherent; outer teeth pale yellow, erect. Inflorescence diœcious.—*Leptotheca*, Schwægr. *Suppl.* t. 137.

**Northern** Island, Auckland, *Knight*. (Australia, Tasmania.) Mitten refers the *Brachymenum ovatum*, *Fl. Antarct.*, of Falkland Islands, to this plant, but in that the leaves are quite entire.

### 33. ORTHODONTIUM, Schwægr.

Slender, tufted, pale green, erect mosses, usually growing on rocks. Leaves long, slender; nerve vanishing; cells lax large, oblong-square. Fruitstalk terminal, slender. Capsule erect or drooping, pyriform or clavate, exannulate, symmetrical, very thin-walled; cells lax; teeth in 2 rows; outer 16, lanceolate, inserted below the mouth, often inflexed when dry; inner 16, filiform, united at the base by a somewhat keeled membrane. Operculum short, conical, beaked. Calyptra small, cucullate, fugacious.

Delicate mosses, resembling *Brya*. There are but few species, chiefly tropical, one is British.

1. **O. sulcatum**, *Hook. and Wils. Ic. Plant. t.* 739 B;—*Fl. N. Z.* ii. 81. Stems tufted, nearly  $\frac{1}{2}$  in. long. Leaves pale, spreading and recurved, linear-lanceolate, nearly flat; nerve vanishing below the apex. Fruitstalk slender. Capsule elliptic-oblong, furrowed and inclined when dry; neck short. Operculum with a short oblique beak. Inflorescence monœcious or hermaphrodite.

**Middle** Island, Port William, *Lyall* (Australia.)



34. **BRACHYMENIUM**, Hook.

Small slender Bryoid mosses. Leaves closely imbricate; reticulations lax. Capsule suberect, oblong subclavate or pyriform, not furrowed, equal at the base; annulus simple; peristome double; outer of 16 linear-lanceolate teeth; inner a membrane irregularly split at the apex into 16 cilia. Operculum conical. Calyptra cucullate.

A small genus of tropical and southern mosses, very closely allied to *Bryum*.

1. **B. coarctatum**, *C. Muell. Synops. i. 312 (Bryum)*. Stems short,  $\frac{1}{4}$ – $\frac{1}{2}$  in. high, tufted. Leaves minute, oblong- or ovate-lanceolate, acuminate, quite entire; nerve stout, ferruginous, exerted as a hyaline point; perichætal larger, longer, narrower. Fruitstalk slender, flexuous, from short basilar shoots. Capsule ovoid, erect; mouth contracted; operculum conic, acute.

**Northern** Island: Auckland, *Knight*; scraps only, picked out of other mosses by Mr. Mitten. (Java, Pacific islands.)

35. **MIELICHOFERIA**, Nees and Hornsch.

Characters and habit of *Bryum*, but the inflorescence is terminal, on short axillary branches, and appears lateral. Capsules pyriform or clavate, oblique or pendulous, with a tapering apophysis often of equal length; peristome simple, of 16 teeth, connate at the base; annulus large, unrolling spirally. Operculum short. Calyptra small, narrow, cucullate.

A genus of a few species of alpine mosses.

1. **M. longiseta**, *C. Muell. Synops. i. 236*. Stems short, erect, simple. Leaves yellowish, lanceolate, acuminate, with a slender excurrent nerve, slightly toothed at the apex; perichætal broader, nearly entire; nerve vanishing. Fruitstalk very long, slender, flexuose. Capsule pyriform, erect or inclined; apophysis of equal length.

**Northern** and **Middle** Islands; Auckland, *Knight*; Alps of Canterbury, *Sinclair and Haast*. (Andes of Columbia.)

36. **BRYUM**, Linn.

Usually erect, densely tufted perennial mosses, rarely creeping, growing in all situations, except aquatic. Stems proliferous at the tips. Leaves usually membranous; nerve distinct; cells rhomboidal. Fruitstalk terminal. Capsule pyriform or clavate, inclined or pendulous; neck short or long; annulus usually present; peristome double; outer 16 simple equidistant teeth, with a dark central line, transversely lamellate on the inner surface, incurved when dry; inner a membrane cleft into 16 keeled teeth, with often interposed cilia. Operculum short, convex, apiculate. Calyptra small, cucullate, fugacious.

One of the largest genera of mosses, found in all parts of the world, especially the cold and mountainous. Many of the New Zealand species are provisional only, and most of them require to be re-examined with more and better specimens. Their characters are often very obscure.

A. *Plants usually annual.* LEPTOBRYUM . . . . . 1. *B. pyriforme*.

B. *Plants perennial.* BRYUM.I. *Upper leaves larger, spreading (except in B. campylothecium), rosulate, more or less serrulate.*

- Upper leaves spreading; margin thickened . . . . . 2. *B. truncorum*.  
 Upper leaves erect, lanceolate; margin hardly thickened . . . 3. *B. campylothecium*.  
 Upper leaves spreading, ovate-oblong; margin not thickened . . 4. *B. Billardieri*.  
 Upper leaves spreading, spatulate; margin not thickened . . . 5. *B. rufescens*.

II. *Upper leaves not larger and spreading, distinctly serrulate (except in B. eximium).*

- a. *Nerve vanishing below the apex of the leaf.*  
 Lower leaves ovate-acuminate . . . . . 6. *B. Wahlenbergii*.  
 Lower leaves lanceolate . . . . . 7. *B. crudum*.  
 β. *Nerve percurrent or excurrent.*  
 Leaves  $\frac{1}{2}$  in. long . . . . . 8. *B. eximium*.  
 Leaves small, oblong-ovate, not crisped when dry. Inflorescence diœcious . . . . . 9. *B. obconicum*.  
 Leaves small, oblong-ovate, crisped when dry. Inflorescence diœcious . . . . . 10. *B. lævigatum*.  
 Leaves small, upper narrow-lanceolate. Inflorescence monœcious . . . . . 11. *B. nutans*.

III. *Upper leaves not large and spreading, quite entire or very obscurely serrulate.*

- a. *Leaves white and silvery* . . . . . 12. *B. argenteum*.  
 β. *Leaves green, very obtuse* . . . . . 13. *B. blandum*.  
 γ. *Leaves green, subulate-lanceolate* . . . . . 14. *B. tenuifolium*.  
 γ. *Leaves ovate or ovate-lanceolate or oblong-lanceolate, acute or acuminate, not white or silvery, nerve excurrent or percurrent.*

† *Inflorescence hermaphrodite.*

- Leaves ovate-lanceolate . . . . . 15. *B. bimum*.  
 Leaves lanceolate, keeled, much crisped when dry . . . 16. *B. torquescens*.  
 Leaves oblong; cells large, soft . . . . . 17. *B. mucronatum*.

†† *Inflorescence diœcious.*§ *Capsule cylindric, clavate or long-pyriform.*

- Leaves erecto-patent, oblong, cuspidate; nerve stout, excurrent . . . . . 18. *B. curvicolium*.  
 Leaves suberect, lanceolate; nerve slender, excurrent in a hair-point . . . . . 19. *B. creberrimum*.  
 Leaves appressed, ovate-oblong; nerve short . . . . . 20. *B. crassum*.  
 Leaves erecto-patent, ovate-lanceolate. Operculum large, mamillate . . . . . 21. *B. cœspiticium*.  
 Leaves erecto-patent, oblong-lanceolate. Operculum shortly conical, apiculate . . . . . 22. *B. chrysoneuron*.

§§ *Capsule short, oblong or pyriform.*

- Capsule pyriform . . . . . 23. *B. annulatum*.  
 Capsule ventricose, depressed at base. Leaf-margin flat . . 24. *B. pachytheca*.  
 Capsule ovate-oblong, rounded at base. Leaf-margin recurved . . . . . 25. *B. atro-purpureum*.

## OF DUBIOUS SECTION.

*B. flaccidum*, *B. varium*, *B. intermedium*, *B. incurvifolium*.

1. **B. pyriforme**, *Hedwig*. Tufts annual or perennial, forming broad silky patches, bright green. Stems simple, slender, rooting at base only. Lower leaves lanceolate, entire, upper linear-setaceous, flexuous, slightly serrate; nerve extending almost to the apex; cells oblong. Fruitstalk slender, flexuous. Capsule inclined or pendulous, pyriform, thin in texture; mouth small; operculum convex.—*Leptobryum*, Wils. Bryol. Brit. 220. t. 28; Fl. Tasm. ii. 188.

**Northern** and **Middle** Islands: probably common, *Colenso*, *Haast*, *Hector*, etc. (N. and S. temperate regions). Messrs. Mitten and Spruce observe that this plant, which is annual in temperate regions, becomes perennial in the tropics.

2. **B. truncorum**, *Bory*;—*Fl. N. Z.* ii. 87. Stems 1–2 in. high. Leaves dark green, upper rosulate, spreading and recurved, crisped when dry, oblong-obovate, acuminate; margin thickened, recurved below, serrulate at the apex; nerve subexcurrent. Fruitstalk curved at the top, 1–3 in. long. Capsule narrowed into the fruitstalk, elongate, cylindric-pyriform, curved, drooping; operculum conical, apiculate.—*Fl. Antarct.* 134 and 415; *Fl. Tasman.* ii. 192; *B. leptothecium*, Taylor.

**Northern** and **Middle** Islands: common on stumps of trees, etc. **Campbell's** Island: barren, *J. D. H.* (Common in the southern hemisphere.) Mitten thinks the name *leptothecium* should be adopted for the New Zealand and Australian moss, whose identity with the original Mascarene one is not established.

3. **B. campylothecium**, *Taylor*;—*Fl. N. Z.* ii. 86. Stems 1–2 in. high, tomentose. Leaves pale yellowish, imbricate, coriaceous, erecto-patent, uppermost rosulate, but not spreading, appressed when dry, obovate-oblong, subacute, obscurely serrulate at the apex, not concave; margins thickened, reflexed; nerve excurrent as a long point. Fruitstalk slender. Capsule pendulous, curved, ovate-oblong or pyriform, with a narrow obconic apophysis; operculum conical, manillate.

**Northern** and **Middle** Islands: probably common on trees and rocks, etc. **Campbell's** Island: mixed with *B. Billardieri*, *J. D. H.* (Australia and Tasmania.) Taylor's original description was, according to Wilson (*Bryol. Brit.* 242, in note), taken from two Swan River plants, of which one is the true *B. Billardieri*. Mitten considers this to be well distinguished from *B. truncorum* by the imbricate, not rosulate upper leaves.

4. **B. Billardieri**, *Schwægr. Suppl. t.* 76;—*Fl. N. Z.* ii. 86. Stems  $\frac{1}{2}$ –1 in. high. Leaves pale green, interrupted, upper rosulate, spreading, crisped and waved when dry, ovate-oblong, subacute; margin not thickened, reflexed below; apex serrulate; nerve subexcurrent. Fruitstalk stout, curved at the top, 2 in. long. Capsule curved, clavate-pyriform, drooping, not narrowed into the fruitstalk; operculum subconical.—*Fl. Antarct.* p. 413; *Wils. Bryol. Brit.* 242. t. 4.

**Northern** Island: moist rocks and trunks, Bay of Islands, *Colenso*, *J. D. H.*; Auckland, *Sinclair*. When growing in the spray, this becomes of a rigid texture and lurid-green colour, the leaves spreading, but hardly rosulate. (Common in the southern hemisphere.)

5. **B. rufescens**, *Hook. f. and Wils.*;—*Fl. Tasm.* ii. 192. t. 174. f. 1. Very closely allied to *B. Billardieri*, but the stems are more slender. Leaves spathulate, softer, reddish-yellow, of looser texture at the base; nerve reddish; margin scarcely recurved. Capsule clavate, arcuate, rather pendulous; mouth purple.

**Middle** Island: Matama river, Otago, in boggy ground, *Hector* and *Buchanan*. Mere scraps, without fruit, identified by Mitten. The stems and leaves are quite black, except the tips, which are yellow-green. (Tasmania.)

6. **B. Wahlenbergii**, *Schwægr. Suppl. t.* 70;—*Fl. N. Z.* ii. 83. Stems  $\frac{1}{2}$ –1 in. long, reddish, erect or ascending. Leaves pale glaucous-green, upper lanceolate, lower ovate-acuminate, concave, pellucid; nerve vanishing near

the serrulate apex. Fruitstalk 1–2 in. long. Capsule pendulous, shortly pyriform; annulus 0; teeth rather large; operculum convex or subconical, mamillate. Inflorescence diœcious.—Wils. Bryol. Brit. 227. t. 47; Fl. Antarct. 134, 414. *B. albescens*, auct.

**Middle Island:** Otago, *Hector and Buchanan*. **Stewart's Island,** *Lyall*. **Lord Auckland's** group (barren), *Lyall*. (Common in the temperate and cold parts of the N. and S. hemisphere.)

7. *B. crudum*, *Schreber*. Loosely cæspitose, glaucous-green, glossy and transparent. Lower leaves broadly ovate-lanceolate, entire, upper longer, ovate-lanceolate, uppermost linear-lanceolate, flexuose; nerve vanishing below the serrate apex. Fruitstalk reddish, flexuose. Capsule suberect, cernuous, oblong or obovate-pyriform; operculum convex, apiculate. Inflorescence in Europe hermaphrodite or diœcious.—Wils. Bryol. Brit. 224. t. 28.

**Middle Island:** Canterbury Alps, *Haast and Sinclair*. (Europe, N. America, India, Fuegia.) A beautiful moss.

8. *B. eximium*, *Mitten, mss.* Inflorescence lax. Stems simple, flaccid, 2–3 in. long. Leaves larger,  $\frac{1}{4}$  in. long, uniform, spreading on all sides, bright green, lax, sometimes deflexed, ovate-oblong or linear-oblong, acute, concave; nerve percurrent; margin indistinctly bordered, obscurely serrate; cells small, oblong. Fruit unknown.

**Northern Island,** *Kerr (Herb. Mitten)*; **Middle Island,** N. E. valley, Otago, *Hector and Buchanan*.

9. *B. obconicum*, *Hornsch.*;—*Fl. N. Z.* ii. 85. Stems with lateral shoots. Leaves clustered at the top of the stem, erecto-patent, not twisted when dry, oblong-ovate, acuminate, serrulate at the apex; margin slightly thickened, recurved; nerve opaque, keeled, excurrent, spinulose at the apex. Fruitstalk curved at the top. Capsule drooping, clavate, curved, with a long neck, which tapers into the fruitstalk; operculum convex, mamillate. Inflorescence diœcious.—Wils. Bryol. Brit. 239. t. 49.

**Northern Island:** Auckland, *Sinclair*. (Europe, Australia, S. Africa.)

10. *B. lævigatum*, *Hook. f. and Wils. Fl. Antarct.* 415. t. 154. f. 3. —*B. crassinerve*, *Hook. f. and Wils.*;—*Fl. N. Z.* ii. 83. Stems  $\frac{1}{2}$ –2 in. long, tomentose with purple root-fibres. Leaves pale yellow-green, erecto-patent, erect and crisped when dry, oblong or ovate-oblong, obtuse or acute, subserrulate towards the recurved apex, very concave, rather coriaceous; margin reflexed; nerve solid, continuous. Fruitstalk 1 in. long. Capsule pendulous, narrow-pyriform, not curved; operculum conical, obtuse. Inflorescence diœcious.

**Northern and Middle Islands:** Auckland, *Sinclair*; Canterbury, *Travers*; Otago, *Hector and Buchanan*. (Australia, Fuegia.)

11. *B. nutans*, *Schreb.*;—*Fl. Antarct.* 134. Stems  $\frac{1}{2}$ –2 in. high. Leaves spreading; upper narrow-lanceolate, serrate towards the apex; lower shorter, ovate-lanceolate, quite entire; nerve strong, continuous. Fruitstalk slender. Capsule nodding or pendulous, oblong-pyriform; operculum large, convex, papillose. Inflorescence monœcious; antheridia in pairs in the axils of the perichætal leaves.—Wils. Bryol. Brit. 225. t. 29.

**Northern Island,** *Kerr (in Herb. Mitten)*. **Middle Island:** top of Kaikera hill, Otago, *Lindsay*; Canterbury, *Haast*.



**Lord Auckland's** group: peaty soil on the hills (barren), *J. D. H.* (Europe, Tasmania.)

12. **B. argenteum**, *Linn.*;—*Fl. N. Z.* ii. 84. Stems very short,  $\frac{1}{4}$ –1 in. high. Leaves silvery or glaucous, very pale and glistening, imbricate, broadly ovate or oblong, concave, obtuse and apiculate or acuminate, quite entire; nerve vanishing beyond the middle; cells large and lax. Fruitstalk rather short, dark red. Capsule small, ovoid or oblong, pendulous, blood-red; operculum mamillate. Inflorescence dioecious.—*Fl. Antarct.* 413; *Wils. Bryol. Brit.* 247. t. 29.

**Middle** Island, *Lyall*; probably common throughout the islands. (Europe, Tasmania, America, India, Australia, Falkland Islands, in Coekburn Island, at the extreme southern limit of terrestrial vegetation, lat. 64° S.)

13. **B. blandum**, *Hook. f. and Wils. Fl. Antarct.* 134. t. 60. f. 1;—*Fl. N. Z.* ii. 83. Stems tufted, 1 in. high, sparingly branched, flaccid. Leaves upper pale yellow-green, shining, lower reddish, loosely imbricate, suberect, appressed when dry, oblong, obtuse, quite entire, very concave; margin not reflexed; nerve slender, reddish, not quite continuous to the tip; cells large, lax. Fruitstalk 1 in. long. Capsule clavate-pyriform, cernuous. Inflorescence dioecious.

**Northern** and **Middle** Islands: probably common, Makororo river, *Colenso*; Bay of Islands, *J. D. H.* (a lurid variety); Auckland, *Knight*; Otago, *Hector and Buchanan*.

**Campbell's** Island, in bogs (barren), *J. D. H.* A beautiful moss, also found in Tasmania.

14. **B. tenuifolium**, *Hook. f. and Wils. Fl. N. Z.* ii. 83. t. 85. f. 5. Stems short, simple,  $\frac{1}{2}$  in. high. Leaves pale green, erect or subsecund, subulate-lanceolate, acuminate; margin recurved, quite entire; nerve solid, excurrent; perichætil longer, slender. Fruitstalk pale. Capsule almost pendulous, oblong, straight or curved, obconic at the base; operculum conical; inner peristome inconstant. Inflorescence dioecious.

**Northern** Island, *Colenso*; Bay of Islands, on clay banks, *J. D. H.*

15. **B. bimum**, *Schreb.*;—*Fl. N. Z.* ii. 85. Stems  $\frac{1}{2}$ –3 in. high, matted by purple radicles. Leaves yellowish-green, spreading, rather twisted when dry, ovate-lanceolate, keeled; margin recurved, quite entire; nerve excurrent. Fruitstalk 2 in. long. Capsule pendulous, obovate-pyriform or obconical, brown; operculum large, convex, mamillate. Inflorescence hermaphrodite.—*Fl. Antarct.* 413; *Wils. Bryol. Brit.* 238. t. 49.

**Northern** and **Middle** Islands: Hawke's Bay, in marshes, *Colenso*; Banks's Peninsula, *Jolliffe*; Otago, *Hector and Buchanan*. (Kerguelen's Land, Tasmania, Europe.)

16. **B. torquescens**, *Bruch and Schimp.*;—*Fl. Tasman.* ii. 190. Stems matted, covered with radicles. Leaves much crisped when dry; lower rather distant, narrow-lanceolate, keeled; margins reflexed; upper crowded, oblong-lanceolate, all concave, quite entire; nerve excurrent. Fruitstalk  $\frac{1}{2}$ –2 in. high, curved at the top. Capsule drooping or pendulous, subincurved, narrow-obconic, with a tapering neck, red-brown; operculum convex, broad, mamillate, purple, shining. Inflorescence hermaphrodite.—*Wils. Bryol. Brit.* 239. t. 49.

**Northern** and **Middle** Islands: Auckland, *Knight*; Hokianga and Banks's Peninsula,  
VOL. I. 2 G

*Jolliffe*; Nelson, *Travers*. (Australia, Tasmania, Enrope, S. Africa.) Apparently scarcely different from *B. bimum*.

17. ***B. mucronatum***, *Mitten*, *mss.* Stems tufted, branching with innovations, 1 in. high. Leaves spreading, oblong, acuminate, with a subrecurved mucro; nerve brown, percurrent or excurrent; margins rather thickened, quite entire; cells large, soft. Fruitstalk elongate. Capsule elongate, pyriform; neck arched, horizontal or pendulous; peristome complete; operculum convex. Inflorescence hermaphrodite. (*Mitten*).

**Middle** Island: Canterbury Alps, *Haast*; Otago, in open ground, *Hector and Buchanan*. M. Mitten observes that this comes very near indeed to the European *B. uliginosum*, differing in the inflorescence and peristome.

18. ***B. curvicolium***, *Mitten*, *mss.*—*B. clavatum*, Hook. f. and Wils.; —Fl. N. Z. ii. 84. t. 85. f. 3, not of Schimper. Stems  $\frac{1}{2}$  in. high, tomentose with brown radicles. Leaves erecto-patent, incurved, firm, rather opaque, ovate or oblong-lanceolate, very concave, cuspidate, quite entire; nerve stout, excurrent. Fruitstalk short,  $\frac{1}{3}$  in. long, red-brown. Capsule suberect or nodding or pendulous, curved, long, narrow, oblong-clavate; operculum subconical. Inflorescence diœcious.

Var. *β. extenuatum*, Fl. N. Z. l. c. Leaves spreading, hardly incurved. Fruitstalk longer. Capsule longer, less pendulous.

Var. *γ*. Capsule suberect; inner peristome adnate to the outer.

**Northern and Middle** Islands: Bay of Islands, *Logan*; Cape Turnagain, *Colenso*; Southern Alps, *Haast*; Otago, *Hector and Buchanan*.—Var. *β*. East Cape, *Sinclair, Colenso*.—Var. *γ*. Manawata river, *Colenso*. (Var. *α*. also found in Tasmania and Tristan d'Acunha.)

19. ***B. creberrimum***, *Tayl.*;—Fl. N. Z. ii. 84. Stems 1 in. high, with long shoots. Leaves olive-green, lax, suberect, when dry erect, twisted and flexuous, lanceolate, acuminate, somewhat keeled; margin subrecurved, quite entire; nerve slender, excurrent as a very fine hair-point. Fruitstalk slender, flexuose; capsule nodding or pendulous, long, slender, subcylindric, narrowed into the slender apophysis; operculum convex, mamillate. Inflorescence diœcious.

**Northern** Island: Bay of Islands and Auckland, *Sinclair, Jolliffe*, etc. (Australia.)

20. ***B. crassum***, *Hook. f. and Wils.* Fl. N. Z. ii. 86. t. 86. f. 1. Stems elongate, rigid, naked and tomentose, with fibrils at the base,  $\frac{1}{2}$  to 1 in. long. Leaves crowded at the tops of the stems, closely imbricate and appressed when dry; lower minute, scale-like; upper coriaceous, ovate-oblong, acute, concave; margin recurved, quite entire (serrulate at the tip?); nerve stout, scarcely excurrent. Fruitstalk  $\frac{3}{4}$  in. high, arched at the top. Capsule pendulous, narrow-oblong, pyriform or subcylindric, scarcely narrowed into the fruitstalk; operculum hemispherical or subconical, apiculate. Inflorescence diœcious.

**Northern** Island: Manakau Bay, on scorix, *Colenso*. (Tasmania.)

21. ***B. cœspiticiu***m, *Linn.* Tufts compact, dark green or yellowish, stems and branches covered with matted radicles. Leaves erecto-patent, straight when dry, terminal larger, ovate or ovate-lanceolate, acuminate; margin reflexed, entire or serrulate at the tip; nerve excurrent. Fruitstalk

elongate. Capsule pendulous, oblong-obovate, mouth contracted when dry; operculum large, mamillate. Inflorescence diœcious.—Wils. Bryol. Brit. 243. t. 29; Fl. Tasman. ii. 191.

**Northern** Island, *Colenso*. **Middle** Island: Otago, *Hector*. Specimens so named by Mitten. The capsule is cylindrical and much longer than in the usual European state. (Ubiquitous.)

22. **B. chrysoneuron**, *C. Mueller in Bot. Zeit.* 1851, 549.—*B. duriusculum*, Hook. f. and Wils.; Fl. N. Z. ii. 84. Stems short. Leaves spreading or erecto-patent, rather rigid, erect when dry, oblong-lanceolate, acuminate, concave; margins quite entire, reflexed; nerve stout, excurrent, or almost so. Fruitstalk very slender, flexuous. Capsule cernuous, oblong-pyriform or cylindric, narrow at the base; operculum shortly conical, apiculate. Inflorescence diœcious.

Var.  $\beta$ . Fl. N. Z. l. c. Leaves smaller, crowded, nerve scarcely excurrent. Fruitstalk and capsule shorter.

Var.  $\gamma$ . Fl. N. Z. l. c. Stems and fruitstalk longer. Leaves distant, spreading, lanceolate. Common throughout the **Northern** and **Middle** islands on banks, etc. Very closely allied to and probably a form of the European *B. sanguineum*.

22. **B. annulatum**, *Hook. f. and Wils. Fl. Antarct.* 134. t. 60. f. 2;—*Fl. N. Z.* ii. 84. Stems very short,  $\frac{1}{8}$  in. high, tufted. Leaves dark green, crowded, rather rigid, spreading, not crisped when dry, ovate-lanceolate, acute, concave; margin quite entire; nerve stout, solid, continuous, hardly excurrent. Fruitstalk  $\frac{1}{4}$ — $\frac{1}{3}$  in. long, arched at the top. Capsule pendulous, shortly pyriform or obovoid, dark brown; annulus very large; teeth yellow, trabeculate; operculum convex, hardly conical. Inflorescence diœcious.

**Northern** and **Middle** Islands: Manawata river, on clay banks, *Colenso*; Otago, *Hector* and *Buchanan*; Canterbury, *Travers*. **Campbell's** Island: on the ground, *J. D. H.*

23. **B. pachythea**, *C. Muell. Synops. Musc.* i. 307;—*Fl. Tasman.* ii. 191. Stems short,  $\frac{1}{4}$ — $\frac{1}{2}$  in. high. Leaves pale dull green, erect when dry, oblong-ovate, acuminate, concave; margin flat, quite entire; nerve stout, excurrent, red. Fruitstalk short, not arched above. Capsule pendulous from the top of the fruitstalk, ovoid, ventricose, rounded and somewhat lobed at the base, red-purple; operculum short, subconical. Inflorescence diœcious.

**Middle** Island: Canterbury, *Travers*. (Tasmania, Australia.)

24. **B. atro-purpureum**, *Weber and Mohr*;—*Fl. N. Z.* ii. 85. Stems very short, branched. Leaves imbricate, erecto-patent, erect when dry, ovate, acuminate, concave; margin recurved, quite entire; nerve stout, subexcurrent. Fruitstalk slender, curved at the top. Capsule pendulous, shortly ovate-oblong, abruptly rounded at the base; operculum broader than the contracted mouth, convex, mamillate. Inflorescence diœcious.—*B. dichotomum*, Hedwig; Wils. Bryol. Brit. 244. t. 50; Fl. N. Z. l. c. 85. *B. erythrocarpum*, Bridel.

**Northern** and **Middle** Islands: Bay of Islands, in clay banks, *J. D. H.* (Australia, South Africa, Europe, and elsewhere); Canterbury, *Travers*.

I have several other *Brya* from New Zealand, which are not in a good enough state to determine properly; amongst others are—

*B. FLACCIDUM*, *Bridel?*, of *Fl. N. Z.* ii. 85, which much resembles *B. caespiticium*.

*B. VARIUM*, *Fl. N. Z.* ii. 85. *t.* 85. *f.* 4, a Dusky Bay plant without fruit, of which I find no specimens in Herb. Hook.

*B. INTERMEDIUM*, *Bridel?*, *Fl. N. Z.* ii. 87, of which a mere scrap was so named by my friend Mr. Wilson.

*B. INCURVIFOLIUM*, *C. Muell. in Bot. Zeit.* 1851, 549, a dubious plant, of which no fruit has ever been found, collected by Mossman at Kiapara.

### 37. **MNIUM**, Bruch and Schimp.

Erect, rarely creeping, loosely tufted, usually rather large perennial mosses; stems proliferous from the base, not from the tops. Leaves large, crowded and spreading at the tops of the stems; cells hexagonal. Fruitstalks terminal, often several together. Capsule pendulous, ovate-oblong, annulate; peristome double, as in *Bryum*. Operculum usually rostrate, rarely convex, and apiculate. Calyptra small, cucullate.

Usually handsome mosses, growing in woods, on moist rocks and trunks of trees, in many parts of the globe, differing in habit more than by tangible characters from *Bryum*; the New Zealand species may be known by the rostrate operculum.

Leaves ovate acuminate, nerve subcontinuous . . . . . 1. *M. rostratum*.

Leaves longer, denser, nerve stronger . . . . . 2. *M. rhynchophorum*.

1. ***M. rostratum***, *Schwagr. Suppl. t.* 79;—*Fl. N. Z.* ii. 87. Stems decumbent, then ascending,  $\frac{1}{2}$ –2 in. long, with creeping barren runners. Leaves large, crisped and undulate when dry, lower ovate acuminate, upper spreading, oblong, obtuse, apiculate; margin thickened, toothed; nerve subcontinuous. Fruitstalk crowded, 1–2 in. long. Capsules nodding or pendulous; operculum rostrate. Inflorescence hermaphrodite.—*Wils. Bryol. Brit.* 254. *t.* 31.

Common in the **Northern** and **Middle** Islands: *Colenso*, etc. (Europe, Asia, America.)

2. ***M. rhynchophorum***, *Hook. and Harv. Ic. Pl. t.* 20. *f.* 3. Very similar to and perhaps a form of *M. rostratum*, but the leaves are longer, of denser substance, with minute cells, and the nerve stronger with a pellucid border.

**Northern** and **Middle** Islands: probably common in woods. Waikare lake, and Tuaranga, *Colenso*; Chalky Bay, *Lyall*. (Europe, Asia, America.)

### 38. **MEESIA**, Hedwig.

Large handsome mosses, with the habit of *Bryum*. Fruitstalk very long and slender. Capsule suberect, obovate or clavate, curved, gibbous at the back; mouth small and oblique; apophysis long, tapering. Peristome double; outer of 16 short entire or split teeth, more or less adherent to the inner peristome, which is longer and formed of a membrane split into 16 keeled processes; annulus small. Operculum small, conical. Calyptra subnitriform, inflexed at the base, fugacious.

A small genus of more or less Alpine mosses.

1. ***M. macrantha***, *Mitten in Hook. Kew Journ. Bot.* viii. 260. Stems tufted, short, branched. Leaves lanceolate, obtuse, margin recurved; nerve



vanishing below the apex; perichaetial large. Fruitstalk long, slender. Capsule pyriform, curved; outer teeth short, obtuse; inner of long regular keeled processes; operculum conic, obtuse. Inflorescence monœcious; male on short branches, surrounded with broad perigonal leaves.

**Middle** Island: Otago, on open ground, *Hector and Buchanan*. (Alps of Victoria.)

### 39. CONOSTOMUM, Swartz.

Densely tufted, erect, bright green, diœcious or monœcious mosses, growing on the ground. Stems covered with radicles. Leaves closely imbricate, erect, narrow; nerve excurrent; cells minute, square. Fruitstalk terminal. Capsule inclined, globose, grooved; mouth small; annulus 0; teeth 16, narrow-subulate, conniving in a cone and joined by their tips. Operculum conic and beaked. Calyptra cucullate.

An Arctic and Antarctic genus, also found on the lofty mountains of temperate and tropical zones. It has been united with *Bartramia* § *Philonotis* by modern authors, but I follow Wilson in keeping it distinct.

Nerve broad . . . . . 1. *C. australe*.  
Nerve slender . . . . . 2. *C. pusillum*.

1. **C. australe**, Swartz;—*Fl. N. Z.* ii. 87. Stems erect, branched, densely tufted,  $\frac{1}{2}$ –1 in. high. Leaves erect, most densely imbricate, linear-lanceolate, acuminate, upper piliferous; nerve broad, excurrent. Fruitstalk 1–1 $\frac{1}{2}$  in. high. Capsule inclined, subglobose; operculum obliquely rostrate. Inflorescence monœcious.—Schwægr. Suppl. t. 130; *Fl. Antarct.* 132 and 411. *Philonotis*, Mitten in *Journ. Linn. Soc.* iv. 81.

**Northern** and **Middle** Islands: Ruahine mountains, *Colenso*;—Canterbury Alps, *Haast, Travers*; Otago, *Hector and Buchanan*. **Lord Auckland's** group and **Campbell's** Head: common on the hills, *J. D. H.* (Tasmania, Fuegia, Andes.)

2. **C. pusillum**, Hook. f. and Wils. *Fl. N. Z.* ii. 88. t. 86. f. 2. Stems  $\frac{1}{4}$ – $\frac{1}{2}$  in. high, loosely tufted. Leaves suberect, laxly imbricate, yellow-green, not appressed when dry, lanceolate, acuminate, piliferous; margin recurved, doubly serrate; nerve slender, excurrent; cells lax. Fruitstalk pale,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Capsule suberect, pale, furrowed when dry; teeth slender, red; operculum not half as long as the capsule, beak inclined. Calyptra brown. Inflorescence monœcious.—*C. purvulum*, Hampe in *Linnæa*. *Philonotis*, Mitten, l. c.

**Northern** and **Middle** Islands: tops of the Ruahine mountains, *Colenso*; Otago, *Hector and Buchanan*. (An alpine, Tasmanian, and Australian moss.)

### 40. CRYPTOPodium, Bridel.

A rather large, loosely tufted, erect, branching, diœcious moss, growing on rocks and trees. Stems curved, covered with leaves throughout their length. Leaves long, erecto-patent, subsecund, sharply serrate; cells dense, square. Fruitstalks shorter than the capsules, often crowded, terminal on lateral shoots. Capsule ovoid, erect, smooth; annulus 0; mouth large; peristome double; outer of 16 lanceolate, acuminate, reflexed (when dry) teeth; inner a membrane split into 16 imperforate teeth, with often cilia between them. Operculum convex, apiculate. Calyptra cucullate. Inflorescence diœcious.

1. **C. bartramiioides**, *Brid.*;—*Fl. N. Z.* ii. 88. Stems 2-6 in. high, long, curved, rigid, sparingly branched. Leaves linear-subulate, with broad sheathing bases, doubly spinulose-serrate; nerve solid. Capsules often 3 together, sunk amongst the leaves.—*Bryum bartramiioides*, Hook. Musc. Exot. t. 18.

**Northern and Middle Islands:** Ruahine mountains, *Colenso*; Pelorus, *Jolliffe*; Dusky Bay, *Menzies*; Otago, *Hector and Buchanan*.—This fine moss has the habit and dense opaque foliage of a *Bartramia*, but the unstriated large-mouthed capsule of *Bryum*. Mitten considers it a congener of *Spiridens*.

#### 41. **BARTRAMIA**, Hedwig.

Small or large, densely or loosely tufted, usually erect mosses, growing on trees, rocks, and earth. Branches fascicled, and stems often covered with matted radicles. Leaves narrow, rigid, serrate, papillose; nerve strong, continuous or excurrent. Cells small, square. Fruitstalk terminal. Capsule usually globose, furrowed when dry, erect, inclined or drooping; mouth contracted; annulus 0; peristome 0, or single or double; outer of 16 lanceolate red smooth teeth, marked with a central line, incurved when dry; inner 16 broad keeled teeth, with 2-fid pointed tips, with or without alternating cilia. Operculum short, flat. Calyptra small, cucullate.

A large genus of mosses, common in alpine and subalpine localities, rare or absent in hot ones. Some of the species here described are excessively near one another.

A. Stems irregularly dichotomously branched. Leaves spreading, not striate. Inflorescence monœcious or diœcious.

\* Capsule hidden amongst the leaves . . . . . 1. *B. Halleriana*.

\*\* Capsule exerted.

Leaf-sheath oblong, blade subulate . . . . . 2. *B. papillata*.

Leaf-sheath broad; blade linear . . . . . 3. *B. patens*.

Leaf-sheath obovate-quadrate, blade subulate . . . . . 4. *B. robusta*.

Leaf not sheathing; nerve very broad, excurrent . . . . . 5. *B. crassinervia*.

B. Branches fascicled. Leaves not striate. Inflor. diœcious (*Philonotis*).

\* Leaves serrulate, margins flat.

Leaves lanceolate, distant, perichaetial with long points . . . . . 6. *B. remotifolia*.

Leaves subulate-lanceolate, perichaetial subulate . . . . . 7. *B. australis*.

\*\* Leaves serrulate, margins recurved . . . . . 8. *B. tenuis*.

\*\*\* Leaves quite entire . . . . . 9. *B. affinis*.

C. Leaves sheathing, distinctly plaited. Inflor. diœcious (*Breutelia*).

\* Branches densely fascicled.

Capsule pendulous; upper cells of leaf short . . . . . 10. *B. pendula*.

Capsule pendulous; upper cells of leaf elongated . . . . . 11. *B. Sieberi*.

Capsule erect or incurved . . . . . 12. *B. comosa*.

\*\* Branches sparingly fascicled.

Sides of sheathing base of leaf rounded . . . . . 13. *B. divaricata*.

Sides of sheathing base of leaf angled . . . . . 14. *B. constrictilis*.

\*\*\* Stems dichotomously branched . . . . . 15. *B. ? elongata*.

1. **B. Halleriana**, *Hedwig*;—*Fl. N. Z.* ii. 88. Stems loosely tufted, tall, 1-2 in. high, subfastigiately branched. Leaves bright yellow-green,

spreading or secund, broad and sheathing at the base, suddenly contracted to a linear very long subulate blade, doubly serrulate; nerve continuous. Fruit-stalk very short, on side shoots, hence appearing lateral. Capsules immersed, often 2 together, much overlapped by the leaves; operculum conical. Inflorescence monœcious.—Wils. Bryol. Brit. 281. t. 23. *B. Mossmaniana*, C. Muell. in Bot. Zeit. 1851, 551.

**Northern and Middle Islands**: on rocks and trees, Ruahine range to Lake Waikare, *Colenso*; Nelson mountains, *Travers*; rocks and banks, Otago, *Hector and Buchanan*. (Europe, N. and S. America, Fuegia, Australia, and Tasmania, mountains of India and Africa.)

2. ***B. papillata***, *Hook. f. and Wils. Fl. N. Z.* ii. 89. t. 86. f. 4. Stems 1 in. high, sparingly branched. Leaves yellow-green, crowded, patent or erecto-patent, striate, more or less crisped when dry, subulate, with an obovate sheathing base, minutely serrulate, papillose at the back; nerve solid. Fruitstalk  $\frac{1}{4}$  in. long, appearing lateral from terminating short lateral shoots. Capsule inclined, subglobose; operculum small, convex. Inflorescence diœcious.—*B. acerosa*, Hampe in Linnæa. *B. fragilis*, Mitten in Linn. Soc. Journ. iv. 81.

**Northern and Middle Islands**: Bay of Islands, Falls of the Waitangi, *J. D. H.*; base of Tongariro and Ruahine range, *Colenso*; Nelson, *Travers*; Otago, on banks, etc., *Hector and Buchanan*. (Australia and Tasmania.)—Very near the European *B. ithyphylla*. M. Mitten informs me that his *B. fragilis* is a state with denser foliage.

3. ***B. patens***, *Bridel*;—*Fl. Antarct.* 133. Stems erect, short, sparingly branched. Leaves spreading, light yellow-brown when dry, lax, rigid, linear or setaceous from a broader sheathing base, acuminate, serrulate; nerve broad, green. Fruitstalk  $\frac{1}{3}$ – $\frac{1}{2}$  in. long. Capsule oblique, broadly oblong; operculum convex, shortly beaked.

**Middle Island**: Otago, *Hector and Buchanan*; **Campbell's Island**, rocks on the hills (barren), *J. D. H.*—Closely allied to *B. papillata*. (Fuegia.)

4. ***B. robusta***, *Hook. f. and Wils. Fl. Antarct.* 133. t. 59. f. 4. Stems erect, loosely tufted, 1 in. high, very stout. Leaves yellow-green, dense, rigid, spreading, rather fragile; base short, oblong, obovate-quadrate, sheathing; blade long, subulate, acuminate, serrulate; nerve very broad and stout, covering the whole breadth of the upper part of leaf. Fruitstalk stout, red,  $\frac{3}{4}$  in. long. Capsule erect, globose, brown; peristome not seen; operculum conical, rostrate, yellow. Inflorescence diœcious.

**Lord Auckland's** group and **Campbell's Island**: moist places in the hills, *J. D. H.*

5. ***B. crassinervia***, *Mitten, mss.* Stems very short, tufted, branched. Leaves spreading, not sheathing at the base, which is subovate; blade lanceolate, acuminate; margins recurved, serrulate; nerve very broad, toothed at the back and apex; lower cells long, upper quadrate; perichaetial broader. Fruitstalk short, red. Capsule subglobose, unequal, plaited; teeth narrow, red; operculum convex, apiculate. Inflorescence hermaphrodite.

**Middle Island**: Fagus forest, on the Hopkins, alt. 2500–3500 ft., *Haast*.—Allied to the European *B. gracilis*, but the nerve is thick, broad, and occupies one-fourth of the width of the leaf.

6. ***B. remotifolia***, *Hook. f. and Wils. Fl. Tasman.* ii. 193. t. 174. f. 3. —*B. appressa*, *Fl. N. Z.* ii. 89. t. 86. f. 5. Stems short, slender, fascicu-

lately branched; branches slender, recurved. Leaves pale, glaucous, distant, spreading, rather crisped when dry, papillose, ovate or lanceolate, acuminate with long points, serrulate; margin plane; nerve slender, pellucid, excurrent; perichætal longer, erect or spreading, almost aristate at the point. Fruitstalk stout, 1 in. long, red. Capsule suberect. Inflorescence diœcious.—*Philonotis appressa*, Mitten in Linn. Soc. Journ. iv. 81. *B. exigua*, Sullivant in Mosses of U. S. Expl. Exped. 11. t. 8. *B. pusilla*, Sulliv. in Hook. Kew Journ. ii. 316. *Hypnum scabrifolium*, Fl. Antaret. 138. t. 60. f. 6.

**Northern** Island: Bay of Islands, Falls of the Waitangi, *J. D. H.*; Wairarapa valley, *Colenso*. **Middle** Island: Otago, *Hector*. **Lord Auckland's** group, *Lyall*. The name *appressa* was abandoned as being unsuited to the female plant, which has spreading leaves. (Tasmania, Fuegia.)

7. **B. australis**, *Mitten*, *ms.* Stems tufted, 1–2 in. high. Leaves spreading or subsecund, broad, lanceolate from a truncate base, gradually attenuated; margins serrulate; nerve excurrent, toothed at the back and apex; cells all elongate, papillose; perichætal ovate at the base. Fruitstalk long, slender. Capsule curved, reniform, plaited; mouth decurved; teeth red, inner yellow. Inflorescence diœcious.

**Middle** Island: Alps of Canterbury, *Travers*, and of Otago, *Hector* and *Buchanan*.—Allied to *B. calcarea*, but the leaves are gradually narrowed from the base upwards, the cells narrower, and margins not recurved, *Mitten*.

8. **B. tenuis**, *Taylor* in *Phytologist*, 1844, p. 1095.—*B. uncinata*, Schwæg.; *Marchica*, Brid.; and *radicalis*, Palisot,—Fl. N. Z. ii. 89. Stems short, slender; branches fascicled, very slender, often curved. Leaves crowded, subfalcate, secund, spreading, narrow, ovate-lanceolate, acuminate with a long point; margin flat or slightly recurved, serrulate; nerve excurrent; perichætal erect, with a setaceous point. Fruitstalk 1 in. long. Capsule cernuous; cilia of inner peristome connected at their apices (in Tasmanian specimens). Inflorescence diœcious; male capitulate.—Fl. Tasman. ii. 193. t. 174. f. 4; C. Muell. in Bot. Zeit. 1851, 552.

**Northern** and **Middle** Islands: abundant in wet places. **Kermadec** Islands, *Milne*. (Tasmania, Australia, Norfolk Island, Tristau d'Acunha.)

9. **B. affinis**, *Hook. Musc. Exot. t.* 176;—*Fl. N. Z.* ii. 90. Stems sparingly branched, 1–2 in. high; branches fascicled. Leaves crowded, erecto-patent, appressed when dry, strict, ovate-lanceolate, narrowed into a very slender point, margin much recurved, quite entire; nerve stout. Fruitstalk  $\frac{1}{2}$  in. high. Capsule ovoid, pendulous; operculum conical, acuminate. Inflorescence diœcious; male discoid.—Schwægr. Suppl. t. 137.

**Northern** and **Middle** Islands: Manakan Bay on scorïæ, *Colenso*; Auckland, *Knight*; Nelson, *Travers*; Otago, *Hector* and *Buchanan*. (Tasmania and Australia.)

10. **B. pendula**, *Hook. Musc. Exot. t.* 21;—*Fl. N. Z.* ii. 90. Stems tall, stout, 2–4 in. long, tomentose; branches fascicled, slender. Leaves spreading, ovate-lanceolate, acuminate, serrulate; nerve excurrent. Fruitstalk slender, 1 in. high. Capsule pendulous, oblong-clavate, grooved.—Schwægr. Suppl. t. 239. Fl. Antaret. 133 and 412.

Abundant throughout the islands, *Menzies*, etc., and in **Campbell's** Island, *J. D. H.* (Tasmania, Fuegia.)



11. **B. Sieberi**, *Mitten in Fl. Tasman.* ii. 194. t. 174. f. 6. Very similar to *B. pendula*, but stouter; branches more robust. Leaves yellow-green, not shining when dry; cells everywhere distinctly papillose, those of the upper portion of the leaf elongated. Capsule oblong, pendulous. Inflorescence diœcious.

**Northern and Middle Islands**: probably common; Bay of Islands, *Sinclair* (growing with *B. pendula*); Canterbury Alps, *Haast, Travers*; Otago, *Hector and Buchanan*. (Australia, Tasmania.)—Wilson does not distinguish this from *B. pendula*.

12. **B. comosa**, *Mitten in Fl. Tasman.* ii. 195. t. 174. f. 7. Stems tall, robust, very tomentose, 2–4 in. high, much fasciculately-branched above. Leaves divaricating, sheathing base short, erect, obovate; blade narrow, lanceolate, serrulate, plaited, minutely papillose; nerve excurrent in a slender point; perichætil smaller, ovate-lanceolate. Fruitstalk about  $1\frac{1}{2}$  in. high. Capsule suberect or inclined, ovoid, grooved; operculum conical. Inflorescence diœcious.

**Northern Island**: Auckland, *Knight*; Bay of Islands, *Cunningham, Jolliffe*. **Middle Island**: Milford Sound, *Lyall*.—Allied to *B. pendula*, but differing in the short erect base of the leaf; cells much shorter. (Tasmania.)

13. **B. divaricata**, *Mitten in Fl. Tasman.* ii. 195.—*B. gigantea*, Fl. N. Z. ii. 90, not Brid. Stems elongate, nearly simple, or with branches sparingly fascicled, tomentose below, 2–4 in. high. Leaves divaricating; base short, sheathing; blade lanceolate, plicate, papillose, serrulate; nerve excurrent; perichætil ovate, quite entire; nerve slender. Fruitstalk long. Capsule ovoid-oblong, horizontal, with a narrow pyriform neck; operculum conical. Inflorescence diœcious.

**Northern and Middle Islands**: Bay of Islands, *J. D. H., Sinclair*; Auckland, *Knight*; Milford Sound, *Lyall*. (Tasmania.)—Scarcely different from *B. comosa* and *pendula*.

14. **B. consimilis**, *C. Muell. Synops.* i. 492.—*Hypnum*, Fl. Antarct. 137. t. 60. f. 4. Stems 3–4 in. high, sparingly fasciculately branched, slender; branches erect. Leaves dark green, spreading, loosely imbricate, uppermost subsecund, gradually narrowed from a quadrate base whose sides are angular, minutely serrulate, plaited; nerve subexcurrent; cells rounded, punctiform. Fruit unknown.

**Lord Auckland's group**: marshy places on the hills, *J. D. H.*

15. **B. ? elongata**, *Mitt. mss.*—*Hypnum*, Fl. Antarct. 137. t. 60. f. 3. Stems very robust, curved, ascending, 4–6 in. long,  $\frac{1}{2}$  in. diameter, very sparingly branched. Leaves closely imbricate, suberect and subsecund, pale yellow and shining when dry, ovate-lanceolate, acuminate, plaited, often waved, serrulate, papillose at the back; nerve slender, excurrent. Fruit unknown.

**Middle Island**: Otago, Waipori Creek, on the ground, *Hector and Buchanan*. **Lord Auckland's group** and **Campbell's Island**, *J. D. H.*—A most beautiful moss, doubtfully referred here.

#### 42. FUNARIA, Schreber.

Short-stemmed, tufted, biennial, monœcious mosses, growing on earth and

on burnt wood, soil, etc. Leaves very membranous, concave, reticulation lax; nerve strong. Fruitstalk terminal, often long and flexuous. Capsule inclined or pendulous, pyriform, curved, gibbous, smooth, oblique, often much contracted; annulus 0 or compound; peristome double; outer 16, oblique, closely-jointed teeth, united at their summits, and forming a reticulated disk, striated below; inner of 16 membranous, lanceolate, flat cilia, opposite the outer teeth, and adhering to their bases. Operculum very shortly conic. Calyptra large, cucullate, inflated, with a subulate tip.

Some of the plants of this genus are amongst the most widely diffused on the globe, *F. hygrometrica* especially appearing everywhere on burnt ground.

Leaves quite entire, nerve continuous.	Operculum convex.	Annulus compound . . . . .	<i>F. hygrometrica</i> .
Leaves serrulate at apex, nerve vanishing.	Operculum flat.	Annulus 0	<i>F. glabra</i> .
Leaves quite entire, nerve excurrent.	Operculum flat.	Annulus 0 . .	<i>F. cuspidata</i> .

1. ***F. hygrometrica***, *Hedwig*;—*Fl. N. Z.* ii. 90. Stems short. Leaves imbricate, crowded into an oblong head, broadly ovate-lanceolate, acuminate, concave, quite entire; nerve continuous; perichætil serrate at the apex. Fruitstalk arcuate. Capsule pendulous, incurved, pyriform; mouth wrinkled; border red; annulus compound; operculum convex.—*Fl. Antarct.* 135, 415; *Wils. Bryol. Brit.* 269. t. 20.

Var. *β. calvescens*. Stems more slender; upper leaves spreading, twisted when dry. Capsule suberect.—*F. calvescens*. *Schwægr. Suppl.* t. 65; *Wilson*, l. c.

Abundant throughout the islands, and as far south as **Campbell's** Island; also in the **Kermadec** Islands and **Chatham** Island. One of the commonest mosses in the world, almost sure to appear where wood has been burned.

2. ***F. glabra***, *Taylor in Hook. Lond. Journ. Bot.* 1846, p. 57;—*Fl. N. Z.* ii. 91. Stems very short. Leaves erecto-patent, obovate, apiculate, serrulate at the apex; nerve vanishing below the apex. Fruitstalk erect, twisted to the left. Capsule clavate-pyriform, curved, gibbous; annulus 0; inner peristome imperfect; operculum nearly flat; margin not coloured.

**Northern** Island: Ahuriri and Raukawa mountains, *Colenso*; Auckland, *Knight*. (S.W. Australia, Tasmania.)

3. ***F. cuspidata***, *Hook. f. and Wils. Fl. N. Z.* ii. 91. t. 86. f. 3. Stems  $\frac{1}{8}$  in. high. Leaves spreading, nearly flat, ovate, acuminate, quite entire; nerve far excurrent. Fruitstalk pale, 1 in. long. Capsule erect, pyriform, small, quite symmetrical; annulus 0; inner peristome imperfect; operculum nearly flat.

**Northern** Island: Bay of Islands, *J. D. H.*

#### 43. ENTOSTHODON, Schwægrichen.

Short, loosely tufted, biennial, monœcious mosses, growing in earth, rarely on stones. Stems short. Leaves membranous; cells large, lax.—Fruitstalk terminal. Capsule erect, pyriform; annulus 0; teeth 16, lanceolate, simple or in pairs, inserted below the mouth, trabeculate on the inner face, erect when dry. Operculum plauo-convex. Calyptra cucullate, very membranous, inflated below.

A small genus, chiefly confined to southern temperate climates. One is British.

1. **E. gracilis**, *Hook. f. and Wils. Fl. N. Z.* ii. 91. t. 86. f. 7. Stems very short,  $\frac{1}{8}$ — $\frac{1}{4}$  in. high, unbranched. Leaves erect, imbricate, oblong, acute or acuminate, concave, quite entire; nerve vanishing below the apex. Fruitstalk very slender, 1 in. high, twisting to the left in drying. Capsule erect, apophysate; operculum nearly flat; annulus 0, contracted below the mouth when dry.

**Northern** Island, *Kerr*; Bay of Islands, *Sinclair*. (Tasmania.)

#### 44. **PHYSCOMITRIUM**, Bridel.

Characters of *Entosthodon*, but teeth 0, and operculum conic.

A rather large genus of mosses, found in all temperate climates. The descriptions are so short that it is not necessary to add a key to the species.

1. **P. apophysatum**, *Taylor*;—*Fl. N. Z.* ii. 91. t. 86. f. 6. Stem very short,  $\frac{1}{4}$  in. high. Leaves few, erecto-patent, ovate, acuminate or almost piliferous, subserrate, concave; nerve vanishing below the apex. Fruitstalk very short, stout. Capsule large, erect, clavate-pyriform, constricted below the mouth when dry.

**Northern** Island: Bay of Islands, on clay banks, *J. D. H.*; Hawke's Bay, *Colenso*. (Swan River, Tasmania.)

2. **P. pyriforme**, (*Bruch and Schimper*,) var.  $\beta$ , *Fl. N. Z.* ii. 92. Stems tufted. Leaves erecto-patent, subspathulate, subacute, concave, serrulate; nerve nearly continuous. Fruitstalk very short. Capsule suberect, turbinate or pyriform; mouth wide; annulus present; operculum conical, apiculate.—(?) *P. conicum*, *Mitten* in *Fl. Tasman.* ii. 197.

**Northern** Island: Bay of Islands, *Colenso*, *J. D. H.*; Auckland, *Knight*. (The *P. pyriforme* is a common European, American, and Australian plant.)

3. **P. pusillum**, *Hook. f. and Wils. Fl. N. Z.* ii. 92. t. 87. f. 1. Stems very short,  $\frac{1}{8}$ — $\frac{1}{4}$  in. high. Leaves spreading, spathulate, obovate- or ovate-oblong, acuminate, nearly entire; nerve nearly continuous. Fruitstalk extremely short. Capsule erect, immersed, subglobose; operculum conical. Calyptra small, conical-mitriform, covering the operculum only, torn at the base. Male inflorescence discoid.

**Northern** Island, *Sinclair*.

4. **P. Perottetii**, *Montagne, Syllog.* 30;—*Fl. N. Z.* ii. 92. Minute. Leaves imbricating and forming an ovoid capitulum, ovate acuminate, very concave, quite entire; nerve excurrent. Capsule pyriform; operculum flat.

**Northern** Island: Auckland, *Knight*.—Apparently the same as the Indian Moss of *Montagne*, but cells are larger and laxer, and nerve more continuous.

#### 45. **EREMODON**, Bridel.

Tufted monœcious or diœcious mosses, growing on old wood, on earth, or on animal matter. Leaves membranous, acuminate, serrate; nerve vanishing; cells large and lax. Fruitstalk terminal. Capsule erect, upper part cylindric, lower forming a narrow apophysis; annulus 0; teeth 8 equidistant or 16 in

pairs, inserted below the mouth, flat, reflexed when dry; spores compound, with 6–8 radiating lines. Operculum conic or convex. Calyptra mitriform or cucullate, glabrous or pilose, lacerate.

The *Eremodons* in the southern hemisphere are the representatives of the large genus *Splachnum* in the northern, but grow on decayed wood or moist ground, not on dung, as is usual with their Northern allies.

Leaves serrated . . . . . 1. *E. robustus*.

Leaves quite entire.

Nerve continuous or excurrent . . . . . 2. *E. octoblepharis*.

Nerve vanishing below the apex . . . . . 3. *E. purpurascens*.

1. ***E. robustus***, Hook. f. and Wils. Fl. N. Z. ii. 93. t. 87. f. 2. Stems 1–4 in. high, tomentose with radicles. Leaves pale, bright green, distant, lax, spreading, spatulate, lanceolate, with acuminate recurved apices, sharply serrated; nerve vanishing below the apex. Fruitstalk stout,  $\frac{1}{2}$  in. high. Capsule erect, oblong-clavate; teeth 8, incurved when dry, wide at the base, yellow; operculum subconic. Calyptra 4-partite at the base, rough at the apex.—*Dissodon callophyllus*, C. Muell. in Bot. Zeit. 1851, 546.

**Northern** Island: Bay of Islands, Sinclair, Oldfield; Auckland, Knight; Hawke's Bay, Jolliffe. (Tasmania.)

2. ***E. octoblepharis***, Hook. f. and Wils. Fl. N. Z. ii. 94. Very similar to *C. robustus*, but smaller; stems 1 in. high. Leaves obovate, long acuminate, almost piliferous, quite entire; nerve continuous or excurrent. Capsule erect, clavate; teeth 8, double, perforated down the middle, reflexed when dry.—*Splachnum*, Hook. Musc. Exot. t. 167; Schwægr. Suppl. t. 129. *S. plagiopus*, Mont. Voy. au Pôle Sud, 285. *Dissodon plagiopus*, C. Muell.

Var.  $\beta$ . *pyriforme*, Fl. Antarct. 123. t. 57. f. 4. Leaves more erect, and crowded.

Var.  $\gamma$ . *major*, l. c. 123. t. 57. f. 4. Leaves larger, broader, lurid-green.

Throughout the islands, abundant. Var.  $\beta$  and  $\gamma$ , Lord Auckland's group and Campbell's Island, J. D. H. (Tasmania and Australia.)

3. ***E. purpurascens***, Hook. f. and Wils.—*Splachnum*, Fl. Antarct. 123. t. 57. f. 6. Larger and laxer than *E. octoblepharis*. Leaves spreading, broadly obovate, acuminate, quite entire; nerve vanishing below the acuminate apex.

**Northern** Island: Auckland, etc., Colenso and Botton, Knight. **Lord Auckland's** group and **Campbell's** Island: in bogs, J. D. H. Not distinct, I suspect, from the *E. octoblepharis*.

#### 46. POLYTRICHUM, Linn.

Erect, tufted, often large, rigid, dark green or brown, monœcious or diœcious mosses, growing on the ground or roots of trees, etc. Stems very rarely branched. Leaves usually long, thick, coriaceous, opaque; nerve very thick, with parallel grooves or plates on the upper surface; cells obscure, very minute. Fruitstalk terminal, stout. Capsule erect or slightly inclined, terete or 4–6-angled, rarely concave or flat on one side, and convex on the other, often contracted below the mouth; annulus 0; teeth 16, 32 or 64, very short, rigid or horny in texture, incurved, of several layers of superposed cells, with a circular membrane stretched loosely across their tips. Operculum flattish, often beaked. Calyptra small, cucullate, naked or densely clothed with a thatch of matted hairs.



A large and remarkable genus, of usually rigid, brown or lurid-green mosses, often large, sometimes gigantic; found in both temperate and tropical climates, but far most abundantly in the former, reaching the Arctic circle.

*A. Calyptra nearly glabrous.*

- |  |                            |
|--|----------------------------|
| I. ATRICHUM, <i>Palisot.</i> Stem simple. Nerve of (toothed) leaf narrow. Capsule terete; operculum with a long beak . . .   | 1. <i>P. angustatum.</i>   |
| II. OLIGOTRICHUM, <i>DC.</i> Stem simple. Nerve of (entire) leaf broad. Capsule ovoid or oblong; operculum long . . .  | 2. <i>P. tenuirostre.</i>  |
| III. PSILOPILUM, <i>Bridel.</i> Stem simple. Nerve of leaf grooved or lamellate. Capsule terete; operculum small.  |                            |
| Leaves spreading, toothed. Teeth 32 . . . . .  | 3. <i>P. crispulum.</i>    |
| Leaves suberect, quite entire. Teeth 16 . . . . .  | 4. <i>P. australe.</i>     |
| IV. POLYTRICHADELPHUS, <i>C. Muell.</i> ( <i>Cyphoma</i> , Hook. f. and Wils.) Stem simple or dichotomous. Capsule horizontal, flat above, concave below . . . . . | 5. <i>P. Magellanicum.</i> |
| V. PHALACROMA, <i>Hook. f. and Wils.</i> Stem tall, fastigiously branched, dendroid. Capsule short, terete.  |                            |
| Stem 4–10 in. high. Leaves linear, from an ovate base . .  | 6. <i>P. dendroides.</i>   |
| Stem 2–4 in. high, scaly. Leaves lanceolate-subulate . .   | 7. <i>P. squamosum.</i>    |

*B. Calyptra clothed with matted hairs.*

- |   |                            |
|---|----------------------------|
| VI. POGONATUM, <i>Palisot.</i> Stem simple or branched above. Capsule terete or nearly so. Apophysis 0. |                            |
| Stem 1–2 in. Operculum shortly beaked . . . . .   | 8. <i>P. tortile.</i>      |
| Stem 2–4 in. Operculum with a long beak . . . . .   | 9. <i>P. alpinum.</i>      |
| VII. EUPOLYTRICHUM, <i>C. Muell.</i> Stem simple or dichotomous. Capsule angled, apophysate.            |                            |
| Capsule 4-angular. Leaves quite entire . . . . .  | 10. <i>P. juniperinum.</i> |
| Capsule 4-angular. Leaves serrate; perichaetial distinct . .  | 11. <i>P. commune.</i>     |
| Capsule 4–6-angular. Leaves serrate; perichaetial 0 . . .   | 12. <i>P. gracile.</i>     |

1. ***P. angustatum***, *Hook. Musc. Exot. t. 50*;—*Fl. N. Z. ii. 94.* Stems slender, 2 in. high. Leaves spreading when dry, waved and crisped, narrow-lanceolate, doubly spinulose-serrate above; nerve slender, sparingly lamellate. Fruitstalks  $\frac{1}{2}$  in. long or more, 1–3 together. Capsule cylindric, slightly curved, brown; operculum with a long, slender, inclined beak. Calyptra slender, spinulose at the apex. Inflorescence diœcious.—*Atrichum ligulatum*, Mitten in Kew Journ. Bot. 1856, 262.

**Northern and Middle Islands:** shaded woods, Huairau, *Colenso*; Otago, by creeks, *Hector and Buchanan*. (Europe and N. America, Tasmania.) Closely allied to the European *P. undulatum*. Mitten distinguishes the southern species as *Atrichum ligulatum*, distinguishing it by the leaves broader towards the apices, not involute when dry, and with wider thickened margins.

2. ***P. tenuirostre***, *Menz.*;—*Hook. Musc. Exot. t. 75*;—*Fl. N. Z. ii. 94.* Stems rigid, short,  $\frac{1}{4}$  in. high. Leaves spreading, incurved when dry, lower ovate-lanceolate, upper oblong-lanceolate, subacute, quite entire, concave; nerve slender, continuous; lamellæ indistinct. Fruitstalk 1–3 in. long, stiff, glossy. Capsule ovate-oblong, suberect, elliptic; operculum with a slender beak, as long or longer than the capsule. Calyptra not seen.

**Middle Island:** Dusky Bay, *Menzies, Lyall*.

3. ***P. crispulum***, *Hook. f. and Wils. Fl. N. Z. ii. 95. t. 87. f. 3.* Stems 1 in. high. Leaves rather flaccid and spreading, crisped when dry, oblong-lanceolate, subacute, toothed, deeply grooved above the middle; nerve broad.

Fruitstalk stout,  $1\frac{1}{2}$  in. long. Capsule inclined, ovate-oblong, terete; mouth small; teeth 32; operculum with a slender beak. Calyptra hairy at the tip, ventricose. Inflorescence diœcious.

**Northern** Island: shaded woods, Huairau, *Colenso*. (Tasmania.)

4. **P. australe**, *Hook. f. and Wils. Fl. N. Z.* ii. 95. *t.* 87. *f.* 6. Stems  $\frac{1}{2}$ –1 in. high. Leaves crowded, erecto-patent, erect and incurved when dry, ovate below, gradually narrowed and oblong-subulate above, subacute, quite entire, densely lamellate; nerve indistinct. Fruitstalk stout,  $\frac{1}{2}$  in. long. Capsule inclined, ovoid, terete; mouth small; teeth 16; operculum with a short deflexed beak. Calyptra short, scabrid at the tip.

**Northern** and **Middle** Islands: Ruahine mountains, *Colenso*; mountains of Otago, alt. 5–6000 feet, *Hector and Buchanan*. (Tasmania.)

5. **P. Magellanicum**, *Hedwig, Sp. Musc. t.* 20;—*Fl. N. Z.* ii. 95. Stems stout, 1–4 in. high, dichotomously branched. Leaves erecto-patent or spreading and recurved, rigid, not altered when dry; base ovate, sheathing, thence subulate, serrate, obscurely lamellate. Fruitstalk stout. Capsule inclined or horizontal, oblong, semiterete; teeth 64; operculum conical, beaked. Calyptra bristly or rough at the apex.—*Fl. Antarct.* 132 and 411. *t.* 59. *f.* 3.—*Catharinea innovans*, C. Muell. in *Bot. Zeit.* 1851, 548.

**Northern** and **Middle** Islands: common on banks, *J. D. H.*, etc. **Lord Auckland's** group, *J. D. H.* (Tasmania and Fuegia.)

6. **P. dendroides**, *Connerson*;—*Fl. N. Z.* ii. 96. Stems 6 in. to 1 foot high, stout, fasciculately much-branched above; the branches spreading like those of a tree. Leaves spreading, sheathing at the base, thence linear-subulate, sharply serrate, lamellate. Fruitstalks elongate, numerous. Capsule short, inclined, cylindrical; mouth large; teeth 64; operculum with a slender beak, longer than the capsule. Calyptra slightly hairy.—*Schwægr.* Suppl. ii. pt. 2. *t.* 151.

**Northern** Island, in subalpine and wooded districts, *Colenso*, etc.; and throughout the **Middle** Island, *Lyall*, etc.—A magnificent moss. (Fuegia and Chili.)

7. **P. squamosum**, *Hook. f. and Wils. Fl. Antarct.* 411. *t.* 153. *f.* 8. Habit and appearance of *P. dendroideum*, but much smaller, 3–4 in. high; branches short, dense, curved. Leaves on the main stem scarious, those of the branches erecto-patent, subulate-lanceolate, strict, serrate, not half the length of those of *P. dendroideum*. Fruit unknown.

**Northern** Island: Taranaki hills, New Plymouth, *Jupp (Mitten)*.—I have seen no New Zealand specimens of this species, which I discovered in Fuegia.

8. **P. tortile**, *Swartz*;—*Fl. N. Z.* ii. 96. Stems simple, 1–2 in. high. Leaves loosely spreading, incurved when dry, sheathing at the base, thence linear-lanceolate, flat, serrate. Fruitstalk 1 in. high. Capsule suberect, nearly terete, obscurely 6-lined; operculum convex, with a short beak. Calyptra clothed with matted hairs.—*P. subulatum*, Menzies in *Linn. Trans.* iv. 303. *t.* 6. *f.* 5.

**Northern** and **Middle** Islands: Bay of Islands, on clay banks, *J. D. H.*; Tehawera, *Colenso*; Hutt valley, *Sinclair*; Auckland, *Jolliffe*; Otago, *Lindsay*. (E. and W. Indies, S. America.)

A doubtful moss, very closely allied to the British *P. aloides*, but apparently identical with the tropical *P. tortile*.

9. **P. alpinum**, *Linn.* Stems 2–4 in. long, curved. Leaves spreading and recurved, long linear-lanceolate, sheathing at the base, suberect when dry; margin incurved, sharply serrate, spinulose at the back; nerve lamellar. Fruitstalk long, stout, yellowish. Capsule erect or inclined, ovoid or oblong, terete; teeth short, narrow; operculum with a long beak. Calyptra covered with red-brown matted hairs.—*Wils. Bryol. Brit.* 207. t. 11; *Fl. Tasman.* ii. 200.

**Middle Island**: Fagus forests of Otago, alt. 2–3000 feet, *Hector and Buchanan*. (Europe, N. America, Australia, Tasmania.)

10. **P. juniperinum**, *Hedwig*;—*Fl. N. Z.* ii. 96. Stems short,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. high, simple, stout. Leaves spreading and recurved, sheathing at the base, thence linear-lanceolate, acuminate and aristate; margins inflexed, quite entire; nerve not reaching the margin, lamellate. Fruitstalk 1–2 in. long. Capsule inclined or horizontal, 4-angled; teeth 64; operculum with a short beak. Calyptra covered with matted hairs.—*Wils. Bryol. Brit.* 213. t. 10.

Common throughout the **Northern** and **Middle** Islands; on banks, in bogs, etc. **Lord Auckland's** group, *Hombroon and Jacquemont*. (Cosmopolitan.)

11. **P. commune**, *Linn.*;—*Fl. N. Z.* ii. 96. Stems simple, rigidly flexuous, 1–4 in. high, red-brown. Leaves spreading, recurved or erectopatent, linear-subulate or lanceolate-subulate, serrate, acuminate, not aristate; nerve overlying the whole width, lamellate; perichæatial membranous, sheathing, erect, piliferous. Fruitstalk 2–3 in. long. Capsule oblong, 4-angled, apophysate; teeth 64; operculum with a short beak. Calyptra covered with matted hairs.—*Wils. Bryol. Brit.* 211. t. 10.

Common throughout the **Northern** and **Middle** islands, *Colenso*, and **Chatham** Island, *W. Travers*. A very handsome moss, found all over the world, used for making brushes and hassocks in England.

12. **P. gracile**, *Menzies*. Stems densely tufted, 2–5 in. high. Leaves short, lanceolate from a sheathing base, with a broad, pellucid, serrate margin, flat; nerve lanceolate; perichæatial 0. Fruitstalk 2–3 in. high. Capsule ovoid, obscurely 4–6-angled; teeth 32 or 64, irregular; operculum beaked. Calyptra shorter than the capsule, covered with pale matted hairs.—*Wils. Bryol. Brit.* 210. t. 46.

**Middle Island**: Canterbury, *Sinclair and Haast*. (Europe, N. America.)

#### 47. DAWSONIA, *Br.*

Large, handsome, rigid, dark green mosses, with the habit and most of the characters of *Polytrichum*. Capsule inclined or horizontal, flat above, convex below; peristome a long brush of capillary cilia, unjointed, fringing the mouth, and also sometimes terminating the columella. Operculum subulate. Calyptra with a covering of matted hairs.

One of the handsomest and most curious genera of mosses, confined to New Zealand and Australia and Tasmania.

1. **D. superba**, *Grev.*;—*Fl. N. Z.* ii. 97. Stems 5–14 in. high, very rigid, naked below. Leaves rigid, dark brown, squarrose or suberect, very

narrow linear-subulate, with a large sheathing base, sometimes 1 in. long, spinulose-serrate. Fruitstalk short, stout, 2–4 in. long. Capsule generally partially hidden by the leaves; peristome of excessively numerous (above 500), filiform, cylindric cilia, in 8 or 9 concentric layers. Calyptra small, covered with smooth matted hairs.

**Northern** and **Middle** Islands; in dense forests, probably common; from Auckland southward, *Sinclair*; Massacre Bay, *Lyall*; Otago, *Lindsay*. One of the most magnificent known mosses. (Tasmania and Australia.)

#### 48. **ANCECTANGIUM**, Br. and Sch.

Tufted, perennial, diœcious mosses, growing on rocks and banks. Stems dichotomous; branches fastigiate. Leaves crowded, linear-lanceolate or subulate; cells small, roundish. Fruitstalk lateral, elongate, slender. Capsule erect, ovoid or obovoid, membranous, with a short inflated apophysis; annulus small; teeth 0. Operculum with a slender inclined beak.

A small European subalpine genus.

1. **A. compactum**, *Schwægr.* Tufts dense, bright yellow-green. Stems 1–4 in. high. Leaves 3-farious, spreading from an erect base, incurved, crisped when dry, lanceolate, acuminate, keeled; margin flat, slightly toothed towards the base; nerve pellucid, subexcurrent. Fruitstalk pale,  $\frac{1}{2}$  in. long. Capsule small, oblong-ovoid, pale; operculum as long as the capsule.—*Wils. Bryol. Brit.* 311. t. 5. *Gymnostomum æstivum*, Hedwig.

**Middle** Island: open grounds, Otago, *Hector* and *Buchanan*. (Europe.)

#### 49. **AULACOPILUM**, Wils.

A minute, creeping, sparingly-branched monœcious moss. Leaves distichous, nerveless, glaucous, papillose; cells most minute. Fruitstalk short, stout, lateral. Capsule erect, ovate-globose, truncate at the mouth, exannulate; teeth 0. Operculum conical, beaked. Calyptra large, including the capsule, and embracing the fruitstalk below it, grooved, split at the side.

1. **A. glaucum**, *Hook. f. and Wils. in Lond. Journ. Bot.* 1848, 90. t. iv. A;—*Fl. N. Z.* ii. 98. Stems creeping,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, sparingly branched. Leaves pale glaucous-green, spreading, appressed when dry, distichous, obliquely ovate, acuminate, papillose; perichaetial erect, lanceolate. Fruitstalk  $\frac{1}{2}$  in. high. Capsule about half as long as the fruitstalk.

**Northern** Island: Bay of Islands, on trees with *Fabronia*, Colenso. (South Africa, *Mitten*.)

#### 50. **FABRONIA**, Bridel.

Minute, tufted, creeping, monœcious mosses, usually growing on trunks of trees. Leaves imbricate, usually ciliate-toothed or serrulate, membranous; cells large, lax. Fruitstalk lateral. Capsule erect, of thin texture, subglobose or pyriform; annulus 0; teeth 16, in pairs, inflexed, coriaceous. Operculum various. Calyptra cucullate.

Generally tropical or subtropical mosses; two are found in Europe.

1. **F. australis**, *Hook. Musc. Exot.* t. 160;—*Fl. N. Z.* ii. 98. Minute.



Stems very slender, creeping, with erect branches  $\frac{1}{4}$  in. high, pale green. Leaves crowded, subsecund, turned upwards, rather concave, ovate or ovate-lanceolate, acuminate, serrulate; nerve reaching halfway; perichætal short, ovate. Capsule not ribbed, subglobose; operculum flattish.

**Northern Island:** Bay of Islands, *Colenso*, *J. D. H.* (Australia.)

## 51. LEUCODON, Bridel.

Creeping, branched, tufted loosely, rather stout, diœcious mosses, growing on rocks and trees; stems erect, often curved, terete; branches sometimes pendulous. Leaves densely imbricate, usually nerveless, grooved striated or smooth; cells long and narrow or dot-like. Fruitstalk lateral. Capsule erect, narrow-oblong; annulus 0 or partial; teeth 16, connate at the base, perforate, 2-3-partite. Operculum conical or rostellate. Calyptra cucullate.

A considerable genus, of which the species are not much allied to one another, and have been variously disposed of by Mitten and others.

Leaves not plaited or undulate, acuminate and piliferous; nerves 0 or 2

short . . . . .	1. <i>L. Lagurus</i> .
Leaves plaited, mucronate, acuminate, nerveless . . . . .	2. <i>L. implexus</i> .
Leaves not plaited, obtuse, nerveless . . . . .	3. <i>L. nitidus</i> .

1. ***L. Lagurus***, *Hook. Musc. Exot. t.* 126;—*Fl. Antarct. i.* 136. Stems tufted, creeping, with erect, short, stout branches,  $\frac{1}{2}$  in. high, covered with matted fibrils. Leaves bright green, glossy, closely imbricated, oblong-ovate, concave, acuminate and piliferous, not striated ribbed or plaited; nerves 0 or short, sometimes 2-nerved to the middle. Fruitstalk 1 in. long. Capsule subcylindrical; teeth united; operculum with a slender oblique beak, half as long as the capsule. Calyptra large. Male inflorescence of a few subglobular antheridia, on very slender stems with variable small leaves.—*Stereodon*, Mitten in *Journ. Linn. Soc. vi.* 88.

**Campbell's Island** (barren). (Fuegia and Tasmania).—Wilson suggests (*Bryol. Brit.* 313) removing this from *Leucodon* under the name of *Lampurus*. The *L. Lagurus*, var.  $\beta$ . of 'Bryologia Britannica,' is a species of *Hypnum* (Mitten).

2. ***L. implexus***, *Kunze*. Tufts dense, soft, bright green, shining, covered below with matted rootlets. Leaves imbricate, suberect, oblong-lanceolate, acuminate, piliferous, deeply plaited, quite entire or minutely toothed at the apex, nerveless. Fruitstalk short. Capsule erect, cylindric-oblong; teeth irregular; operculum conical, almost beaked.—*L. hexastichus*, Mont. *L. Kunzeanus* and *Neckera implexa*, C. Mueller.

**Middle Island:** Nelson Mountains, *Sinclair*; Otago, on rocks and trees, *Hector and Buchanan*. (Chili.) Determined by Mitten; the leaves have longer acuminate points than in Mueller's description of the Chili plant.

3. ***L. nitidus***, *Hook. f. and Wils. Fl. N. Z. ii.* 99. *t.* 87. *f.* 4. Stem about 1 in. long, procumbent, branches obtuse. Leaves loosely imbricate, oblong, obtuse, concave, quite entire, not striate, nerveless, pale green, shining; margins subrecurved; perichætal longer, convolute. Fruitstalk  $\frac{1}{4}$  in. long, red. Capsule erect, oblong, grooved when dry; teeth red, irregularly split halfway down, trabeculate; operculum long-beaked.—*Stereodon Lyallii*, Mitten in *Journ. Linn. Soc. iv.* 89.

**Northern and Middle Islands**: Bay of Islands, on trunks of trees, rare, *J. D. H.*; Nelson, *Travers*. Mr. Wilson remarks that this curious moss has the habit of *Pterogonium*, and may perhaps form a new genus, for which he proposes the name *Dichelodontium*.

## 52. LEPTODON, Mohr.

Creeping, much-branched, tufted, diœcious perennial mosses; branches pinnate, usually elastically curving inwards when dry. Leaves quite entire; nerve short; cells dot-like. Fruitstalk lateral. Capsule straight, erect or inclined; annulus 0; teeth 16, very short, linear-lanceolate, membranous. Operculum beaked. Calyptra cucullate, clothed below with very long hairs.

A genus of few species, some tropical, and one or two temperate.

1. **L. Smithii**, *Bridel*;—*Fl. N. Z.* ii. 99. Stems 1–3 in. long, slender; branches 2-pinnate. Leaves rounded-ovate, obtuse; nerve vanishing above the middle. Fruitstalk very short. Capsule suberect, oval-oblong.—*Wils. Bryol. Brit.* 317. t. 14.

**Middle Island**, *Lyall*, on bark; Otago, N.E. valley, on trunks of trees, with a north exposure, *Hector and Buchanan*. (Europe and South Africa.)

## 53. CLADOMNION, Hook. f. and Wils.

Loosely tufted, creeping mosses, with erect generally long and slender, nearly simple branches. Leaves imbricate all round, plaited and striate, nerveless. Fruitstalk very short, lateral. Capsule erect, straight, grooved; peristome double; outer of 16 lanceolate teeth; inner, a membrane deeply divided into 16 keeled cilia. Operculum beaked. Calyptra large, cucullate.

I follow Wilson in keeping this genus as defined in the 'Flora of New Zealand,' excluding *C. setosum*, which I refer back to *Cyrtopus* of Bridel. Mitten refers *C. ericoides* and *sciuroides* to the section *Achyrophyllum* of Hypnum, to which no doubt they are naturally much allied in foliage and in which the capsule is angled.

Leaves quite entire . . . . .	1. <i>C. ericoides</i> .
Leaves serrated at the apex . . . . .	2. <i>C. sciuroides</i> .

1. **C. ericoides**, *Hook. f. and Wils. Fl. N. Z.* ii. 99. Stems creeping; branches 2–8 in. long, suberect, nearly simple, stout. Leaves pale red or yellow-brown, shining, imbricate, ovate or oblong, acuminate, with recurved apices, concave, quite entire, plaited and striate; nerve 0. Fruitstalk  $\frac{1}{2}$  in. long. Capsule erect, oblong, 8-grooved; outer teeth yellow, firm; inner of 16 keeled cilia, united halfway up; operculum with a slender beak; spores very large. Calyptra yellowish. Male inflorescence axillary, small, often clustered.—*Leskea*, *Hook. Mus. Exot.* t. 140. *Stereodon*, Mitten in *Journ. Linn. Soc.* iv. 89.

**Northern and Middle Islands**: common, south of Auckland, *Menzies*, etc.; Nelson, *Travers*; Otago, *Hector and Buchanan*.

2. **C. sciuroides**, *Hook. f. and Wils. Fl. N. Z.* ii. 100. Stems creeping; branches suberect, incurved, rather flattened. Leaves yellow-brown,

when dry rather shining, subsecund, erecto-patent, ovate, acuminate, serrate at the apex, plaited and striate; nerve 0. Fruitstalk  $\frac{1}{8}$  in. long. Capsule erect, oblong, 8-grooved; outer teeth pale; inner a membrane with rudimentary cilia; spores small; operculum conical-subulate, half as long as the capsule. Inflorescence diœcious.—*Leskea*, Hook. Musc. Exot. t. 175. *Stereodon*, Mitten in Journ. Linn. Soc. iv. 89. *Neckera glyptotheca*, Mueller (in Herb.).

**Middle Island**: Nelson, *Bidwill*; Otago, *Hector and Buchanan*. (Tasmania.)

#### 54. METEORIUM, Bridel.

Flaccid, pale green, diœcious mosses. Stems creeping over trees and stones, then pendulous, often very long and flexuous; branches short, spreading. Leaves imbricate, usually very delicate, shining, concave, nerved or nerveless, smooth or striate; cells small. Fruitstalk lateral, very short. Capsule erect, straight, narrow, oblong or ovoid; annulus 0; peristome double; outer of 16 erect teeth; inner as many cilia, free, or united by a membrane at their bases. Operculum beaked. Calyptra cucullate.

Beautiful tropical and southern mosses; none are British.

Pendulous; stems 6–18 in. long.

Leaves oblong-spathulate, obtuse; nerve 0. . . . . 1. *M. molle*.

Leaves ovate-cordate, apiculate; nerve vanishing. . . . . 2. *M. cuspidiferum*.

Leaves ovate-cordate, acuminate; nerve produced beyond the middle . . . . . 3. *M. flexicaule*.

Pendulous; stems 1–4 in. long.

Minute. Leaves ovate-lanceolate; nerve very short . . . . . 4. *M. pusillum*.

Leaves ovate-lanceolate; nerve produced to or beyond the middle 5. *M. nitens*.

1. **M. molle**, Hook. f. and Wils. Fl. N. Z. ii. 100. Stems very long, pendulous, slender, flexuous, flaccid, 1–8 in. long; branches nearly simple. Leaves pale straw-coloured, shining, imbricate, oblong-spathulate, obtuse, subcordate at the base, margins incurved; apex inflexed, concave, quite entire; nerve 0; perichætil twice as long, sheathing. Fruitstalk  $\frac{1}{8}$  in. long. Capsule ovoid; inner peristome divided to the middle into 16 keeled cilia; operculum with a slender beak as long as the capsule. Calyptra hairy, dimidiate.—*Leskea mollis*, Hedwig, Musc. Frond. 4. t. 40. *Neckera*, C. Muell. *Stereodon*, Mitten in Journ. Linn. Soc. iv. 88.

Throughout the **Northern** and **Middle** Islands: common in forests, etc. (Australia, Tasmania, Chili, Fuegia.)

2. **M. cuspidiferum**, Tayl. mss.;—Fl. N. Z. ii. 101. Stems as in *M. molle*. Leaves dark green or yellowish, loosely imbricate, erecto-patent, ovate-cordate, apiculate, semiamplexicaul and slightly toothed at the base, elsewhere quite entire, keeled, substrate; nerve vanishing; cells most minute.—*Trachypus Hornschuchii*, Mitten in Journ. Linn. Soc. iv. 91.

Var. *β. cerina*; leaves broader, waved when dry; margins reflexed at the base.—*T. cerinus*, Mitt. l. c.

Common in the **Northern** and **Middle** Islands: Saddle Hill, Otago, *Lindsay*; Bay of Islands, *Sinclair*, J. D. H. **Kermadec** Islands, *Milne*. *β. Middle* Island, *Lyall*. (Norfolk Island, Tasmania, East Indies.)

3. **M. flexicaule**, *Hook. f. and Wils. Fl. N. Z.* ii. 101. Stems pendulous, flexuous, very slender indeed, 4–10 in. long. Leaves dull yellow or brownish, loosely imbricate ovate-cordate or subspathulate, shortly acuminate, concave, not striated, margin quite entire except at the obscurely-toothed base; nerve produced to the middle.—*Trachypus flexicaulis*, Mitten, l. c. *Leskea flexicaulis*, Taylor.

**Northern** and **Middle** Islands, *Dr. Stanger*; Hawke's Bay, *Colenso*; Wellington, *Stephenson*; Otago, *Hector and Buchanan*; Nelson, *Travers*. (Tasmania, Andes.)

4. **M. pusillum**, *Hook. f. and Wils. Fl. N. Z.* ii. 101. t. 88. f. 1. Minute; stems very slender, weak, 1 in. long. Leaves dull green, loosely imbricate, suberect when dry, ovate-lanceolate, acuminate, margin quite entire, subrecurved; nerve very short; perichæatial erect, lanceolate. Fruit-stalk  $\frac{1}{8}$  in. long. Capsule half as long as the fruitstalk, ovoid, 8-grooved, pale; operculum conical, very short.

**Northern** Island: Wairarapa valley, *Colenso*.

5. **M. nitens**, *Hook. f. and Wils. Fl. N. Z.* ii. 101. t. 87. f. 7. Stem 1–2 in. long, creeping, then pendulous, slender; branches numerous, short, ascending,  $\frac{1}{10}$ – $\frac{1}{4}$  in. long. Leaves shining, yellow-green, crowded, erect when dry, ovate-lanceolate, acuminate, margin subrecurved, minutely denticulate, somewhat striate; nerve vanishing about or above the middle; cells very narrow.

**Northern** Island, *Sinclair*.—A scrap without habitat or fruit.

## 55. CRYPHÆA, Mohr.

Slender, monœcious, creeping on trees or rocks; branches erect or pendulous, somewhat pinnately divided. Leaves imbricate, ovate, quite entire, nerved; cells very minute, like dots. Fruitstalk lateral, extremely short, hidden by the perichæatial leaves. Capsule erect, narrow-oblong; annulus present; peristome double; outer 16 narrow erect teeth; inner 16 filiform free cilia. Operculum conical. Calyptra very small, mitriform, conic, glabrous, scarcely covering the operculum.

A genus of several tropical and temperate species.

Leaves ovate-lanceolate, quite entire; perichæatial piliferous . . . . .	1. <i>C. parvula</i> .
Leaves broadly ovate, long-acuminate, quite entire . . . . .	2. <i>C. acuminata</i> .
Leaves very broadly ovate, obtuse, quite entire . . . . .	3. <i>C. dilatata</i> .
Leaves orbicular-ovate, acute, minutely serrulate . . . . .	4. <i>C. Tasmanica</i> .

1. **C. parvula**, *Mitten, mss.*—*C. consimilis*, *Fl. N. Z.* ii. 101, not of Montagne. Stems creeping, 1–2 in. long; branches distant, spreading, filiform. Leaves ovate-lanceolate, acuminate, margin quite entire, subrecurved; nerve nearly continuous; perichæatial broadly obovate, retuse, suddenly produced into a piliferous acuminate point. Fruitstalk scarcely visible. Capsule ovoid; operculum conical, acute. Calyptra red-brown, rough at the apex. Inflorescence monœcious.

**Northern** Island: Wairarapa valley, *Colenso*; Otago, *Hector and Buchanan*. (Tasmania, Australia).—Very near the Chilean *C. consimilis*, but differing in the perichæatial leaves exceeding the operculum, and in the wider cauline leaves (*Mitten*).



2. **C. acuminata**, *Hook. f. and Wils. Fl. N. Z. ii. 102. t. 88. f. 4.* Stems very short,  $\frac{3}{4}$  in. long, sparingly branched. Leaves dull yellow-green, erecto-patent, ovate, long-acuminate, quite entire; nerve vanishing above the middle; perichætil larger, setaceous at the apex. Capsules secund, sessile, hidden by the perichætil leaves; operculum conical, with a short beak. Inflorescence monœcious.

**Northern** Island: on trees, Hawke's Bay, etc., *Colenso*; Otago, *Hector and Buchanan*.

3. **C. dilatata**, *Hook. f. and Wils. Fl. N. Z. ii. 102. t. 88. f. 2.* Stems 2-6 in. long, slender, pendulous, branched; branches very short, spreading. Leaves dull green, spreading, erect when dry, loosely imbricate, broadly ovate, obtuse, quite entire, concave; nerve vanishing below the subcrenulate apex; perichætil lanceolate; nerve stronger. Capsules sunk amongst the perichætil leaves, often crowded, scattered or secund; operculum conic. Inflorescence monœcious.

**Northern** Island, *Colenso*.

4. **C. Tasmanica**, *Mitten in Fl. Tasman. ii. 204. t. 175. f. 6.* Stems elongate, naked below, above furnished with short close-set subsecund branches. Leaves spreading, orbicular-ovate, acute, margin flat, most minutely serrulate; nerve vanishing below the apex; perichætil ovate, then subulate. Capsule sunk in the perichætil leaves; operculum convex, acute.

**Middle** Island: Otago, on trees?, *Hector*. (Tasmania.)

## 56. CYRTOPUS, Bridel.

Stem erect, subpinnately branched. Leaves crowded, subsecund or suberect, serrate, with a stout nerve. Fruitstalk very short. Capsule oblong, erect; peristome of *Cladomnion*. Operculum beaked.

The genus *Cyrtopus* was established as a section of *Neckera*, by Bridel, upon this and a few other plants that have been placed in various genera by subsequent authors. I have thought it best in this work to retain it for this plant, which has been referred to five other genera, as its synonymy shows.

1. **C. setosus**, *Bridel, Bryol. ii. 234.—Cladomnion, Fl. N. Z. ii. 100.* Stems erect, flexuous, 6 in. long, nearly simple. Leaves dark greenish, crowded, subsecund, rigid, ovate at the base, then subulate with setaceous rigid apices, serrate; nerve solid. Fruitstalk very short. Capsule scarcely emerging from the leaves, erect, not grooved, oblong; teeth red; operculum with the beak shorter than the capsule. Calyptra yellow-brown.—*Neckera*, *Hook. Musc. Exot. t. 8. Spiridens*, *Mitten in Journ. Linn. Soc. iv. 89. Auæctangium*, *Hedwig, Sp. Musc. 43. t. 5. f. 4, 6.—Pilotrichum, C. Muell.*

**Northern** and **Middle** Islands: abundant from Bay of Islands, *Sinclair*, to Dusky Bay, *Menzies*, etc. (Tasmania, South America, Sandwich Islands.)

## 57. MESOTUS, Mitten.

A stout tufted moss; stem short, creeping, covered with matted rootlets; branches erect, stiff, simple or forked, crowded. Leaves close-set, spreading

serrulate; nerve percurrent. Capsule ovoid-oblong, not furrowed, suberect, hidden amongst the leaves, lateral from the growth of innovations (but originally terminal according to Mitten); peristome single; teeth 16, red, equidistant, irregularly torn at the apex. Operculum conical, acuminate. Calyptra small, mitriform, lobed at the base.

A remarkable moss, of which Mitten says that it has the structure of leaf of *Symblypharis*, creeping stem of *Macromitrium*, and teeth of *Grimmia*. Dr. Schimper considers it to be truly pleurocarpous, and allied to *Esenbeckia*.

1. **M. celatus**, *Mitten, mss.* Branches 1–2½ in. high, robust. Leaves dull yellow-green, crowded, twisted when dry, erecto-patent when moist, ovate at the base, then lanceolate-subulate, keeled; margins flexuous, quite entire below, above serrulate; nerve percurrent; perichætical numerous, pale, convolute, broad below, suddenly contracted to a subulate point.

**Middle Island**: Otago, on dry banks, *Hector and Buchanan*.

## 58. PHYLLOGONIUM, Bridel.

Bright green shining or glistening mosses, creeping on the trunks of trees; stems short, pinnately branched; branches quite flat and frond-like. Leaves distichous, equitant, very closely imbricate, folded along the middle, sharply keeled, nerveless; cells long and narrow. Fruitstalk lateral, very short. Capsule suberect, straight; annulus 0; teeth 16, equidistant, flat. Operculum beaked. Calyptra large, nearly mitriform, rather hairy, torn at the base.

A tropical and subtropical genus of most beautiful mosses, remarkable for their golden-green hue and the almost metallic brilliancy of their lustre.

1. **P. elegans**, *Hook. f. and Wils. in Fl. N. Z. ii. 102. t. 88. f. 6.* Stems creeping, about 1 in. long; branches lanceolate, ½ in. broad. Leaves oblong-rhomboid, obtuse, quite entire, so concave as not to be flattened without splitting; perichætical shorter, erect. Fruitstalk as long as or shorter than the capsule, which is turbinate, and when dry has a wide mouth and exerted columella.

**Northern and Middle Islands**: on smooth bark of trees, from the Bay of Islands, *J. D. H.* etc.; Auckland, *Jolliffe*, to Otago, *Hector and Buchanan*.

## 59. NECKERA, Hedwig.

Stems creeping on trees and rocks; branches erect, pinnately divided, flattened. Leaves complanate, sub-2-farious, 8-fariously inserted, oblique, often transversely waved, shining, transparent; cells very minute. Fruitstalk lateral, short or moderately long. Capsule erect, ovoid or oblong; annulus 0; peristome double; outer of 16 lanceolate teeth, trabeculate on the inner face; inner a membrane divided into 16 keeled teeth. Operculum obliquely beaked. Calyptra cucullate, glabrous.

A considerable genus, in both temperate and tropical climates, very rare or unknown in cold and frigid regions.

Leaves ovate-lanceolate, acuminate . . . . . 1. *N. pennata*.  
Leaves oblong, rounded at the apex . . . . . 2. *N. laevigata*.

1. **N. pennata**, *Hedwig*;—*Fl. N. Z.* ii. 103. Stems pinnately branched. Leaves bright green, shining, undulate, ovate-lanceolate, acuminate, serrulate at the apex; nerve very short and inconspicuous; inner perichæatial narrow-lanceolate, acuminate. Capsule hidden by the leaves; operculum with a short beak. Calyptra small, scarcely covering the operculum. Inflorescence monœcious.—*N. hymenodonta*, C. Muell.; *Wils. Bryol. Brit.* 414. t. 34.

**Northern** and **Middle** Islands: Wagera and Wawari, on trunks of trees, *Colenso*; Auckland, *Knight*; Otago, *Hector and Buchanan*. (Europe, Asia, and America.)

2. **N. lævigata**, *Hook. f. and Wils. Fl. N. Z.* ii. 103. t. 88. f. 3. Stems 1 in. and more high, pinnately branched, 2–4 in. long. Leaves bright green, loosely imbricate, not undulate, rather rigid, oblong, very obtuse, quite entire, convex; nerve short. Fruitstalk imbricating, convolute, lanceolate, sheathing the fruitstalk, which is  $\frac{1}{10}$  in. long. Capsule exserted.

**Middle** Island: Banks's Peninsula, *Lyall*; Queensland Bush, Otago, *Martin (Hb. Lindsay)*, *Hector and Buchanan*.

## 60. TRACHYLOMA, Bridel.

Stems stout, erect from a creeping rhizome, tree-like, flattened, pinnately branched above. Leaves distichous, not oblique, flattened, nerve indistinct; cells minute. Fruitstalk slender. Capsule erect, straight or slightly curved, oblong or cylindric; annulus 0; peristome double, outer 16, narrow, coriaceous, nodose teeth; inner 16, narrow, keeled, nodose cilia united by a membrane at the base; operculum with a long, straight beak. Calyptra cucullate.

A considerable genus in tropical and temperate regions.

1. **T. planifolium**, *Bridel*;—*Fl. N. Z.* ii. 103. Stems stout, erect, about 3 in. high, rising from a stout creeping rhizome. Leaves bright-green, shining, distichous, erecto-patent, ovate, serrate at the tip; nerve very faint,  $\frac{1}{3}$  their length; perichæatial long, narrow, serrate. Fruitstalk  $\frac{1}{2}$  in. long and upwards, flexuous, often curved at the top. Capsule erect, subcylindric, equal or slightly unequal; outer teeth  $\frac{1}{3}$  the length of the capsule, pale yellow, incurved when dry; inner almost white; operculum conic-subulate.—*Neckera planifolia*, *Hook. Musc. Exot.* t. 23 (scarcely of *Hedwig*).

**Northern** and **Middle** Islands: from Bay of Islands (*Wilkes's Exped.*) and Waikahi, *Sinclair*, to Dusky Bay, *Menzies*, and *Hector and Buchanan*.

## 61. ISOTHECIUM, Bridel.

Stout, stiff, erect, tree-like, diœcious mosses. Stem rising from a creeping rhizome; branched (often pinnately) above, naked below. Leaves inserted all round the branches, usually spreading or squarrose, nerveless or 1–2-nerved, often serrate; cells minute, dense. Fruitstalks lateral, often crowded towards the top of the stem, long or short, straight or curved at the top. Capsule erect or cernuous, straight or curved; annulate; peristome double; outer of 16 lanceolate teeth, each marked with a middle line, reflexed when dry, trabeculate in the inner surface; inner a membrane deeply divided into 16 cilia, with or without interposed cilia. Operculum conic or beaked. Calyptra cucullate.

A large tropical and temperate genus, differing from *Hypnum* in the erect dendroid habit and usually curved cernuous capsules. All the New Zealand species are dioecious, some are amongst the handsomest mosses in the islands. *Hypnum hispidum* (p. 472) should perhaps be transferred to near *I. pandum*. I have great difficulty in discriminating some of the species under sections A  $\beta$  and B  $\beta$ .

A. Stem erect, leafy, and more or less pinnately branched from the base.

a. *Leaves more or less serrulate; nerve strong.*

Stem 2-3 in. Nerve spinulose at the back. Capsule erect, grooved . . . 1. *I. sulcatum*.  
Stem 3-5 in. Nerve not spinulose. Capsule terete . . . . . 2. *I. pandum*.

$\beta$ . *Leaves entire or nearly so; nerve 0 or 2 faint.*

Stem 2-3 in. Leaves spreading, broad-ovate, acute, entire, 2-nerved . . . 3. *I. Arbuscula*.  
Stem 2-3 in. Leaves spreading, broad-ovate, acuminate, entire, 2-nerved . . . . . 4. *I. ramulosum*.  
Stem 1-2 in. Leaves spreading, narrow ovate-oblong, serrulate, 2-nerved . . . . . 5. *I. angustatum*.  
Stem 1 in. Leaves erecto-patent, long acuminate, quite entire, nerveless . . . . . 6. *I. pulvinatum*.  
Stem 1 in., very slender. Leaves imbricate, oblong, obtuse . . . . 7. *I. gracile*.

B. HYPNODENDRON.—Stem naked below, rigid, fastigiate branched above.

a. *Capsule terete; operculum conical.*

Branches umbellate. Leaves ovate, serrate, cuspidate . . . . . 8. *I. Menziesii*.  
Branches flattened. Nerve spinulose at the back . . . . . 9. *I. Kerrii*.

$\beta$ . *Capsule grooved. Operculum with a slender beak.*

\* Branches not whorled, nearly simple, flattened. Leaves ovate, serrate . . . . . 10. *I. spininervium*.  
\*\* Branches whorled, pinnate. Leaves oblong-lanceolate, serrate . . 11. *I. marginatum*.  
\*\*\* Branches stout, densely fascicled or whorled. Leaves rigid, serrate, subulate-lanceolate.  
Branches whorled, suberect. Nerve terete, smooth . . . . . 12. *I. comosum*.  
Branches fascicled, lateral, decurved. Nerve keeled . . . . . 13. *I. Sieberi*.  
Branches fascicled, lateral, decurved. Nerve terete, spinulose at the point . . . . . 14. *I. comatum*.

1. ***I. sulcatum*, Hook. f. and Wils. Fl. N. Z. ii. 104.** Stems suberect, 2-3 in. long, subovate, pinnately or 2-pinnately branched; branches divaricating, crowded. Leaves yellowish, crowded, imbricate, suberect, ovate, obtuse, mucronate, serrulate at the apex, concave; nerve solid, serrated at the back. Fruitstalk  $\frac{1}{4}$  in. long, towards the top of the stem or on the branches. Capsule erect, cylindrical, 8-grooved, reddish; teeth yellow, outer incurved when dry; operculum subulate.—*Leskea*, Hook. Musc. Exot. t. 164. *Clinacium*, Bridel.

**Northern and Middle Islands:** Bay of Islands, *J. D. H.*, etc.; Auckland, *Sinclair*; Canterbury, *Sinclair and Haast*. (Australia.)

2. ***I. pandum*, Hook. f. and Wils. Fl. N. Z. ii. 105. t. 89. f. 1.** Stems 3-5 in. high, naked below, arcuate or deflexed; branches pinnate. Leaves shining yellow-green, distichously imbricate, flattened, ovate or oblong, obtuse or apiculate, towards the apex serrulate; nerve stout; cells dot-like. Fruitstalk  $\frac{1}{2}$  in. long, arcuate at the top. Capsule horizontal, subcylindric, contracted at the base, nearly straight; operculum conical, beaked.



**Northern and Middle Islands:** not uncommon on rocks and stumps of trees, from the Bay of Islands, *J. D. H.*, to Otago, *Lyall*.

3. **I. Arbuscula**, *Hook. f. and Wils. Fl. N. Z.* ii. 104. Stems erect, 2–3 in. high, naked below, rigid, rising from a stout rhizome, 2-pinnately branched; branches sometimes decurved and rooting. Leaves pale straw-colour, imbricate, spreading, sometimes obscurely distichous, ovate, acute, quite entire, very concave; nerves 2, indistinct. Fruitstalk  $\frac{1}{4}$  in. long, flexuous, stout, often curved at the top. Capsule suberect or cernuous, ovoid, straight or curved, not grooved; operculum conical.—*Hypnum*, *Hook. Musc. Exot.* t. 112. *Stereodon*, *Mitten* in *Journ. Linn. Soc.* iv. 88.

Var. *B. deflexum*. Apices of stem and branches elongated and deflexed, often rooting at the tips.—*Stereodon deflexum*, *Mitten*, l. c.

Throughout the islands, abundant on trees, **Lord Auckland's** group and **Campbell's** hold, *J. D. H.* (Australia, Tasmania, Aneiteum.) *Mitten* regards var. *deflexum* as a distinct species.

4. **I. ramulosum**, *Mitten*, *mss.* Very similar indeed to *I. Arbuscula*, but the leaves are not nearly so concave, and strongly acuminate.

**Northern and Middle Islands:** common on trunks of trees and from the Bay of Islands, *Jolliffe*, to Otago, *Hector* and *Buchanan*. **Chatham** Islands, *Travers*. (Victoria.)

5. **I. angustatum**, *Mitten (Stereodon)*, *Journ. Linn. Soc.* iv. 88. Very similar to *I. Arbuscula*, but smaller in all its parts, 2–3-pinnately divided. Leaves spreading, subcompressed, narrow-oblong ovate, acute, concave, quite entire, those in the branches serrulate above; perichaetial subulate, spreading. Capsule short, ovoid, horizontal.

**Northern and Middle Islands:** probably common, *Raoul*; Auckland, *Lyall*, *Knight*; Otago, *Dunedin*, *Hector* and *Buchanan*; Chain Hills, *Lindsay*.

6. **I. pulvinatum**, *Hook. f. and Wils. Fl. N. Z.* ii. 105. t. 88: f. 5. Small, stems 1 in. high, curved or decurved; branches pinnate, subincurved. Leaves bright green, erecto-patent, secund, ovate, long-acuminate, rather concave, quite entire; nerve 0; perichaetial squarrose. Fruitstalk  $\frac{1}{4}$  in. long, curved at the top. Capsule ovate, cernuous, terete; operculum conical.

**Northern** Island, *Colenso*; Bay of Islands, *J. D. H.*; Auckland, *Bolton*.

7. **I. gracile**, *Hook. f. and Wils.*;—*Fl. N. Z.* ii. 106.—*Hypnum*, *Fl. Antarct.* 141. t. 61. f. 3. Stems short, procumbent or suberect from a creeping rhizome, sparingly subpinnately branched; branches straight or recurved. Leaves pale green, opaque, imbricate, secund, oblong or ovate-oblong, hardly acute, concave, obscurely toothed; nerves 1–2, very short; perichaetial squarrose. Fruitstalk  $\frac{3}{4}$  in. long, quite smooth. Capsule cernuous, oblong; operculum conic; annulus large. Inflorescence diœcious.—*Hypnum gracilescens*, *C. Muell. Stereodon*, *Mitten*.

**Middle Island:** Otago, *Buchanan*; Nelson, *Jolliffe*. **Lord Auckland's** group, *J. D. H.* (Tasmania.) Very similar in habit to *Pterogonium filiforme*.

8. **I. Menziesii**, *Hook. f. and Wils. Fl. N. Z.* ii. 105. Stems stout, erect, 2–5 in. high; fastigiate branched above; branches subumbellate, spreading. Leaves yellow-green, shining, lower squarrose, ovate-cordate, with very slender acuminate apices; upper rather compressed, ovate, cuspidate, concave;

margin and strong nerve serrated at the back; nerve often vanishing below the apex; cells narrow. Fruitstalk 2-3 in. high. Capsule suberect or pendulous, smooth, large, oblong-cylindrical, not grooved; mouth not contracted; operculum short, conical.—*Hypnum*, Hook. Musc. Exot. t. 33.

Common throughout the islands, *Menzies*, etc.

9. **I. Kerrii**, *Mitten in Journ. Linn. Soc.* iv. 86 (*Trachyloma*). Habit and appearance of *I. Menziesii*. Leaves ovate, acute, toothed; nerve slender, excurrent, toothed at the back. Capsule unequal, horizontal, not grooved; operculum conic with a short beak.

**Northern and Middle Islands**: apparently common, Auckland, *Jolliffe*; Wellington, *Stephenson*; Waikahi, *Sinclair*; Canterbury, *Travers*; Otago, *Hector and Buchanan*.

10. **I. spininervium**, *Hook. f. and Wils. Fl. N. Z.* ii. 105. Stems robust, erect, 2-3 in. high, fastigiate branched at the top; branches simple, spreading. Leaves glossy, bright green, subdistichously imbricate, ovate, acute, serrated at the margin and back; nerve solid. Fruitstalk  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. high, erect or arched at the top. Capsule oblong, cylindric, grooved, cernuous; operculum with a slender beak, shorter than the capsule.—*Hypnum*, Hook. Musc. Exot. t. 29. *Rhacopilum*, C. Muell.

Var.  $\beta$ . *arcuatum*. Fruitstalk short, arcuate.—*Hypnum arcuatum*, Hedwig, Sp. Musc. t. 62. *Pterigophyllum*, Bridel, Bryol. ii. 348. *Trachyloma*, Mitten.

Abundant throughout the islands, *Menzies*, etc. (Tasmania, Java.)

11. **I. marginatum**, *Hook. f. and Wils. Fl. N. Z.* ii. 106. t. 89. f. 2. Stem robust, erect, red, 2-4 in. high; branched at the top; branches whorled, pinnately divided, decurved. Leaves dull green, crisped when dry, ovate-oblong or oblong-lanceolate, acute, rather concave; margin thickened, serrulate; nerve thick, spinulose at the back. Fruitstalk crowded, stout, 1-1 $\frac{1}{2}$  in. high, arcuate at the top. Capsule cernuous, cylindrical, grooved; operculum with a slender beak.—*Hypnum limbatum*, Sullivan?

**Northern and Middle Islands**; common in moist forests. Mitten inclines to suppose that *Hypnum limbatum* is only a young state of *I. marginatum* (see under *Hypnum*).

12. **I. comosum**, *Hook. f. and Wils. Fl. N. Z.* ii. 106. Stems very stout, rigid, 1-3 in. high, densely covered with matted radicles; branches in one or more crowded whorls, stout, suberect or horizontal, somewhat pinnately divided. Leaves rigid, dusky-green, reddish when dry, spreading, subsecund, ovate-lanceolate, with a rigid subulate apex; margin serrate; nerve terete, not keeled, smooth at the excurrent point. Fruitstalks usually numerous, crowded at the top of the stem, stout. Capsule cernuous or pendulous, subcylindric, grooved; operculum nearly as long as the capsule, beak slender.—*Hypnum*, Labill. Fl. Nov. Holl. ii. t. 253, Schwægr. Suppl. t. 91. *Trachyloma*, Mitten.

Abundant throughout the islands, and in **Lord Auckland's** group and **Campbell's** Island. A stout handsome moss. (Tasmania, Australia, Java.)

13. **I. Sieberi**, *Hook. f. and Wils. Fl. Tasman.* ii. 296. Stem stout, erect, tomentose, 1-4 in. high, branched from the sides; branches not whorled, stout, deflexed, subcuspidate. Leaves green, not fulvous, crowded, erecto-patent, narrow-lanceolate, gradually acuminate, striate when dry;

margin thickened, coarsely serrate; nerve stout, keeled at the back, excurrent. Fruitstalks crowded,  $\frac{1}{4}$ – $\frac{3}{4}$  in. high. Capsule horizontal, grooved; operculum with a long beak. Inflorescence dioecious.—*Hypnum Sieberi*, C. Muell. Synops. ii. 504.

**Lord Auckland's group.** (Tasmania.) Very similar to *I. comosum* but more robust, greenish, not fulvous, branches decurved, lateral, not whorled. Leaves longer, more crowded, more serrated and striated, cells larger, nerve not cylindrical, keeled at the back.

14. ***I. comatum*, C. Muell.** Synops. ii. 692. Habit and ramification of *I. Sieberi*, but branches fewer, not cuspidate. Leaves deep green, lax, patent, subsecund, rigid, cordate, lanceolate at the base, narrowed into a long subulate, setaceous, acutely-serrated apex; nerve excurrent, stout, punctulate at the back, serrated at the cylindric point; cells at the outer base large. Fruitstalks crowded,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long. Capsule pendulous, elongate, cylindrical, 8-grooved, rather curved; operculum with a long beak.—*I. Colensoi*, Fl. Tasman. ii. 207. t. 176. f. 1.

**Northern Islands:** Taranaki hills, Jupp, Kerr. **Middle Island:** Nelson, Travers; Canterbury, Haast; Otago, Hector and Buchanan. (Tasmania.)

## 62. ENTODON, C. Muell.

Stem compressed, decumbent or procumbent, pinnate. Leaves ovate, imbricate all round the stem, shining, 2-nerved at the base, entire. Fruitstalk straight. Capsule erect, cylindric, regular. Peristome double; outer teeth 16, rigid, not hygrometric, inserted below the mouth of the capsule, split at the apex; inner of 16 narrow cilia; annulus present or 0; columella exerted. Operculum short. Calyptra dimidiate.

A small genus, native of Europe and other countries.

1. ***E. truncorum*, Milten.** Tufts depressed; stems pinnately branched. Leaves spreading, compressed, imbricated so as to form cuspidate ends to the branches, concave, oblong, acuminate, quite entire; nerves very short; upper cells narrow, basal quadrate; inner perichætil erect, convolute, with lanceolate-subulate apices. Fruitstalk short. Capsule erect, cylindric, pale red; operculum subulate.

**Middle Island:** Otago, Hector and Buchanan. Resembles the northern *E. cladorrhizans*, but leaves narrower, with more numerous distinct quadrate cells at the base. Peristome incomplete. (Mitten.)

## 63. HYPNUM, Linn.

Stems creeping, variously branched; branches erect prostrate or pendulous, terete, or compressed. Leaves distichous or imbricated all round, often secund; nerves 1, 2, or 0; cells and reticulation various. Fruitstalk lateral, slender, usually curved at the top and then smooth or scabrous. Capsule curved, horizontal, inclined or drooping, usually annulate; terete (grooved or angled in § *Acicularia*); peristome double, outer of 16 lanceolate teeth, marked with a middle line, inner surface trabeculate, inner a membrane cut to the middle into 16 keeled teeth with or without interposed cilia. Operculum various. Calyptra cucullate, glabrous (hairy in *H. pubescens*).

One of the largest genera of mosses, found in all parts of the globe. The species are extremely difficult of discrimination. Considerable experience and proficiency are required before a beginner can name any of the species correctly. Most of the New Zealand ones are referred to *Stereodon* by Mitten, but I have in this genus as in others followed Wilson's and my own generic nomenclature, as given in the Flora of New Zealand, being convinced that it is on the whole the best for a local flora; there are however no limits to the discrepancies of opinion as to the system and nomenclature of the pleurocarpous mosses, and as to which the highest authorities are completely at issue. The groups here adopted are pretty natural, but it is not always easy to perceive the characters upon which they are founded, especially those of the second-leaved group (*Cupressiformia*), to which so many species belong.

#### KEY TO THE GROUPS AND SPECIES OF HYPNUM.

##### I. *Stem and branches covered with matted radicles amongst the leaves.*

A. TAMARISCINA. Leaves small. Nerve strong. Fruitstalk smooth.

##### II. *Stem and branches not covered with radicles.*

a. *Leaves imbricate all round the stem, squarrose or erect or incurved, or second or falcate, not 2-farious or distichous.*

\* *Leaves more or less falcate and second, often circinate.*

B. ADUNCA. Stems flaccid. Operculum short, conic.

C. HISPIDA. Stems elongate, rigid. Nerve very strong. Operculum beaked.

D. CUPRESSIFORMIA. Stem flaccid. Nerve 0 or short and slender. Operculum beaked.

\*\* *Leaves spreading, not squarrose nor large nor concave.*

E. PROLONGA. Fruitstalk scabrid. Operculum beaked.

F. CONFERTA. Fruitstalk smooth. Operculum beaked.

G. RUTABULA. Fruitstalk scabrid. Operculum conic.

H. SERPENTIA. Fruitstalk smooth. Operculum conic.

\*\*\* *Leaves squarrose and spreading, large and often concave.*

I. STELLATA. Capsule not grooved.

J. PTYCHOMNION. Capsule grooved.

\*\*\*\* *Leaves closely imbricate, not squarrose, large and concave.*

K. COCHLEARIFOLIA.

β. *Stems compressed. Leaves imbricate, the lateral spreading 2-fariously.*

L. DISTICHOPHYLLA.

A. **Tamariscina.**—*Stems pinnately or 2-pinnately branched, covered with matted green, fibrillous rootlets. Leaves imbricated all round the stems and branches, not 2-farious or distichous; nerve stout.*

\* *Stems procumbent, straight or slightly arcuate.*

Stems pinnately branched; branches irregular in length. Leaves not plaited; perichaetial with few cilia . . . . . 1. *H. furfurosum.*

Stems pinnately branched; branches short, close-set, regular. Leaves plaited; perichaetial with many cilia . . . . . 2. *H. fulvastrum.*

Stems 2-pinnately branched . . . . . 3. *H. sparsum.*

\*\* *Stems very arcuate, proliferous from the descending assurgent apices, 2-pinnate.*

Leaves of branches incurved; nerve prominent below the apex on the back . . . . . 4. *H. læviusculum.*

Leaves of branches with erect apices; nerve not prominent . . . . . 5. *H. denticulosum.*

B. **Adunca.**—*Leaves falcate, second; nerve single, continuous or vanishing below the apex. Fruitstalk smooth. Operculum short, conical (unknown in H. limbatum). Often aquatic or marsh mosses.*



\* *Nerve vanishing below the middle.*

- Leaves circinate, striate, subserulate . . . . . 6. *H. uncinatum*.  
 Leaves not striate, deltoid at the base, quite entire . . . . . 7. *H. Kneiffii*.  
 Leaves not striate, lanceolate, quite entire or subserulate . . . . . 8. *H. fluitans*.  
 Leaves circinate, lanceolate from an ovate base, quite entire . . . . . 9. *H. brachiatum*.

\*\* *Nerve continuous.*

- Leaves cordate at the base, quite entire . . . . . 10. *H. filicinum*.  
 Leaves oblong- or linear-lanceolate, serrate . . . . . 11. *H. limbatum*.

C. **Hispida**.—*Stems rigid, stiff, sparingly branched. Leaves falcate and secund, nerve very stout.*

- Leaves ovate, rigid, nerve excurrent . . . . . 12. *H. hispidum*.  
 Leaves ovate, rigid, nerve vanishing . . . . . 13. *H. glauco-viride*.  
 Leaves ligulate from an ovate base . . . . . 14. *H. umbrosum*.

D. **CUPRESSIFORMIA**. *Stems flattened. Leaves more or less secund, falcate or circinate, imbricate all round the stem or obscurely 2-farious; cells at the outer base often large; nerve 0 or 1-2, short. Fruitstalk smooth (rather rough in *H. cerviculatum*).—Species very difficult of discrimination.*

\* *Operculum as long as the capsule.*

† *Leaves strongly falcate or circinate.*

- Leaves lanceolate, long acuminate; perichætal serrulate . . . . . 15. *H. cerviculatum*.  
 Leaves linear-lanceolate; perichætal similar. Branches long . . . . . 16. *H. tenuirostre*.  
 Leaves linear-lanceolate; perichætal broader. Branches short . . . . . 27. *H. amenum*.

†† *Leaves slightly falcate.*

a. *Leaves quite entire or obscurely serrulate.*

- Leaves lanceolate, subpiliferous. Capsule pendulous . . . . . 18. *H. crassiusculum*.  
 Leaves oblong, acuminate; perichætal similar. Capsule horizontal . . . . . 19. *H. Jolliffei*.  
 Leaves ovate or oblong, acuminate; perichætal narrower. Capsule suberect . . . . . 20. *H. homomallum*.  
 Leaves lax, minute, lanceolate. Capsule pendulous . . . . . 21. *H. molliculum*.

β. *Leaves distinctly serrulate.*

- Leaves deltoid-ovate . . . . . 22. *H. pubescens*.  
 Leaves linear-lanceolate . . . . . 23. *H. leptorhynchum*.

\*\* *Operculum shorter than the capsule.*

† *Leaves entire or nearly so, nerveless.*

a. *Leaves strongly falcate, ovate-lanceolate.*

- Leaves acuminate; perichætal setaceous . . . . . 24. *H. chrysogaster*.  
 Leaves acuminate; perichætal subpiliferous . . . . . 25. *H. cupressiforme*.  
 Leaves subpiliferous. Capsule pendulous . . . . . 26. *H. mundulum*.  
 Leaves subpiliferous. Capsule suberect . . . . . 27. *H. limatum*.

β. *Leaves obscurely falcate-secund.*

- Stems short, slender. Leaves narrow-lanceolate . . . . . 28. *H. pulchellum*.  
 Stems elongate, slender. Leaves oblong-lanceolate . . . . . 29. *H. acutifolium*.

†† *Leaves 2-nerved, serrulate, strongly falcate.*

- Stems pinnately branched. Capsule pendulous . . . . . 30. *H. sandwicense*.

E. **PRÆLONGA**. *Leaves spreading, imbricate all round the stem, not squarrose nor secund, serrulate in the N. Z. species; nerve reaching about halfway up. Fruitstalk scabrid; operculum beaked.—Small-leaved species, always creeping or prostrate. (Leaves subsecund in *H. austrinum*.)*

- Leaves lanceolate, subpiliferous . . . . . 31. *H. muriculatum*.

- Leaves ovate or ovate-lanceolate, acuminate . . . . . 32. *H. austrinum*.  
 Leaves ovate-cordate acute . . . . . 33. *H. remotifolium*.

F. CONFERTA. Leaves imbricating all round the stem, not squarrose nor secund, usually small and serrulate. Fruitstalk smooth (see *H. plumosum* in G.). Operculum beaked.

- Leaves ovate, gradually acuminate; perichætal recurved . . . . . 34. *H. tenuifolium*.  
 Leaves broadly ovate, suddenly acuminate; perichætal recurved . . . . . 35. *H. elusum*.  
 Leaves oblong, piliferous; perichætal erect . . . . . 36. *H. aristatum*.

G. RUTABULA. Leaves spreading, imbricate all round the stem, not squarrose, rarely subsecund; nerve reaching beyond the middle in the N. Z. species. Fruitstalk rough (obscurely so in *H. plumosum*). Operculum short, conical.

- Leaves ovate-acuminate, serrulate. Operculum acuminate . . . . . 37. *H. rutabulum*.  
 Leaves ovate-lanceolate, acuminate, secund-falcate, serrulate. Operculum very obtuse . . . . . 38. *H. paradoxum*.  
 Leaves subsecund, ovate-lanceolate. Operculum very acute . . . . . 39. *H. plumosum*.

H. SERPENTIA. Leaves imbricated all round the stem, not squarrose, rarely subsecund; nerve short or reaching beyond the middle. Fruitstalk smooth. Operculum short, conic (see *H. plumosum* in G.). Usually very minute mosses.

- Leaves ovate-lanceolate . . . . . 40. *H. serpens*.

I. STELLATA. Leaves imbricated all round the stem, small, spreading and squarrose. Fruitstalk smooth. Capsule not grooved.

- Leaves ovate-lanceolate, acuminate; nerve reaching halfway . . . . . 41. *H. polygamum*.  
 Leaves ovate, acuminate; nerve solid, continuous . . . . . 42. *H. relaxum*.  
 Leaves ovate, long-acuminate; nerve vanishing below the apex . . . . . 43. *H. decussatum*.

J. ACICULARIA. Stems stout, suberect, sparingly branched. Leaves imbricated all round, squarrose, large, very concave, flaccid, serrate, nerveless. Capsule grooved or angled. Calyptra large, inflated.

- Leaves squarrose and recurved, strongly serrate above . . . . . 44. *H. aciculare*.  
 Leaves refracted from the middle, minutely serrulate above . . . . . 45. *H. densifolium*.

K. COCHLEARIFOLIA. Stems stout or slender, prostrate, sometimes pendulous. Leaves imbricated all round, often appressed, not squarrose or secund, very concave and inflated, transparent, obtuse or apiculate; nerve 0 or obscure. Fruitstalk smooth. Capsule not grooved. Operculum conical.

\* Nerve very short or 0.

- Stems 2-4 in. long. Leaves hemispherical, very obtuse . . . . . 46. *H. cochlearifolium*.  
 Stems 2-3 in. long. Leaves broadly oblong, obtuse, cordate at the base . . . . . 47. *H. clandestinum*.  
 Stems 1-2 in. long. Leaves orbicular-quadrata, auricled at the base, round at the apex . . . . . 48. *H. chlamydophyllum*.  
 Stems 1 in. high. Leaves large, oblong, very concave, acute or acuminate . . . . . 49. *H. inflatum*.  
 Stems ascending. Leaves broadly ovate, shortly acuminate . . . . . 50. *H. vajum*.

\*\* Nerve produced to the middle.

- Stems 2-5 in. long. Leaves broad oblong, subacute . . . . . 51. *H. divulsum*.

L. DISTICHOPHYLLA. Stems and branches compressed. Leaves inserted all round the stem, but distichous (the lateral only 2-farious in *H. polystictum*), flat or concave, nerveless or shortly 2-nerved. Fruitstalk and capsule smooth.

\* Leaves nerveless.

- Stems 2-4 in., pinnately branched. Leaves subserrulate; cells not papillose . . . . . 52. *H. extenuatum*.

Stem 1 in., vaguely branched. Leaves quite entire. . . . . 53. *H. politum*.

Stem 1½ in., pinnately branched. Leaves serrulate; cells papillose. 54. *H. polystictum*.

\*\* Leaves 2-nerved at the base.

Leaves entire or denticulate . . . . . 55. *H. denticulatum*.

#### A. TASMARISCINA.

1. ***H. furfurosum***, *Hook. f. and Wils. Fl. N. Z.* ii. 107. t. 88. f. 7. Stem procumbent, slender, rigid, slightly arcuate, 1–2 in. long, pinnately branched, covered with matted fibrils; branches rather long, distant, filiform. Leaves green or yellowish, squarrose on the stem, suberect on the branches, incurved when dry, ovate-cordate, acuminate, somewhat keeled, scarcely plicate, quite entire or serrate towards the apex; perichætil larger, erect, long-acuminate, somewhat ciliate. Fruitstalk 1 in. long, smooth, red. Capsule pale-brown, cylindric-oblong, cernuous, slightly curved; operculum beaked, shorter than the capsule.—*H. unguiculatum*, *Fl. Tasm.* ii. 208. t. 176. f. 3. (?) *H. hastatum*, *C. Muell. Synops.* ii. 485.

**Northern and Middle Islands:** probably common on moist rocks and trunks of trees; Bay of Islands, *Cunningham*, etc.—A puzzling moss, difficult to discriminate from the two following. Mitten, who has paid much attention to the discrimination of the species of this section, informs me that the *H. hastatum*, *C. Muell.*, may belong to this as well as *H. Stuartii*, for that is very variable. He has less doubt in referring *H. unguiculatum* to the same species. (Tasmania, Australia.)

2. ***H. fulvastrum***, *Mitten in Journ. Linn. Soc.* iv. 92 (*Leskea*). Similar to *H. furfurosum*, but branches short and close-set, giving a linear outline to the frond. Cauline leaves secund, plaited, those of the branches and branchlets evenly disposed on every side; perichætil much ciliate.—Mitten, mss.

**Northern and Middle Islands:** probably common, Auckland, *Knight, Bolton, Kerr*, etc. (Tristan d'Acunha.)

3. ***H. sparsum***, *Hook. f. and Wils. Fl. N. Z.* ii. 109. t. 89. f. 5. Stems very slender, matted, creeping, 1 in. long, 2-pinnately branched; branches short, very slender. Leaves dark green, very minute, spreading, incurved when dry, ovate or ovate-cordate, subobtus, quite entire, but rough at the edges; nerve stout, pellucid, vanishing below the apex; perichætil much larger, long-acuminate, inner laciniate. Fruitstalk ½ in. long, smooth. Capsule inclined or cernuous, narrow-oblong. Inflorescence diœcious.

**Northern Island,** *Colenso*; *Wangarei, Bolton*; *Waikahi, Milne*. **Middle Island,** *Nelson, Travers*. This differs from *H. furfurosum* chiefly in the 2-pinnate stems. (Australian Alps.)

4. ***H. læviusculum***, *Mitten in Fl. Tasm.* ii. 207 (*Leskea*). Stems arcuate, regularly 2-pinnate, proliferous from the descending assurgent apices. Leaves of *H. furfurosum*, those of the branchlets compressed, with incurved apices; nerve cristate at the back; cauline subcrenulate, with flexuous points; nerve not excurrent, vanishing below the filiform apex.—Mitten in *Journ. Linn. Soc.* iv. 92.

**Northern and Middle Islands:** probably common; *Kiapara, Mossman*; *Wellington, Stephenson*; *Milford Sound, Lyall*. (Tasmania.)

5. *H. denticulosum*, *Mitten, mss.* Very similar to *H. læviusculum*, but leaves of the branches patent, not compressed, their apices erect; nerve not protuberant on the back below the apex; cauline leaves not narrowed into a filiform apex, all the leaves with the margins minutely closely denticulate.—*Mitten*.

**Northern** Island: Auckland?, *Herb. Sinclair*.

#### B. ADUNCA.

6. *H. uncinatum*, *Hedwig*;—*Fl. N. Z.* ii. 107. Stems 1–2 in. high, slender, erect, pinnately branched. Leaves crowded, secund, falcate, circinate, subulate-lanceolate, narrowed into very slender points, striate, subserrulate; nerve vanishing below the apex; perichætil very long, striate. Fruit-stalk 1 in. high, reddish. Capsule cernuous, oblong, smooth; operculum conical, apiculate. Inflorescence monœcious.—*Hedwig*, *Musc. Frond.* iv. t. 25; *Wils. Bryol. Brit.* 394. t. 26.

**Northern** and **Middle** Islands: in wet bogs, etc., *Huiarau* river, *Colenso*; *Canterbury*, *Sinclair* and *Haast*; *Otago*, *Hector* and *Buchanan*. (Almost all cold climates.)

7. *H. Kneiffi*, *Schimper*;—*Fl. N. Z.* ii. 107. Very similar to *H. uncinatum*, but leaves less crowded, not circinate, ovate-lanceolate, acuminate, deltoid at the base, concave, quite entire, not striated; nerve reaching half-way. Capsule oblong, cernuous; operculum conical. Inflorescence diœcious.—*Wils. Bryol. Brit.* 390. t. 58.

**Northern** and **Middle** Islands: *East Cape*, *Colenso*; *Dusky Bay*, *Lyall*.—Specimens all very imperfect and without fruit. (Europe, N. Asia, N. America.)

8. *H. fluitans*, *Linn.*;—*Fl. Antart.* i. 141. Stems erect or floating, 1–3 in. long, subpinnately branched. Leaves yellow-brown, loosely imbricate, falcate, secund, lanceolate, acuminate, subserrulate or entire; nerve vanishing beyond the middle. Fruitstalk 2–3 in. long. Capsule oblong, cernuous; operculum conical.—*Wils. Bryol. Brit.* 387. t. 58.

**Campbell's** Island: swampy places, barren, *J. D. H.* (All temperate and cold latitudes.)

9. *H. brachiatum*, *Mitten, mss.* Stems matted, 4–5 in. long, pinnately branched, red-brown below, pale green and yellow above. Leaves falcate-secund, much incurved, concave, lanceolate from a broad ovate base, long-acuminate, quite entire; nerve vanishing below the apex; perichætil erect, elongate, lanceolate, convolute. Fruitstalk slender. Capsule shortly cylindrical, arcuate; operculum conical, acuminate.

**Northern** and **Middle** Islands: *Tobago Bay*, *Knight*; *Otago*, in wet grounds, *Hector* and *Buchanan*.—Very nearly allied to the European *H. revolvens*, and scarcely distinguishable from it, except (according to *Mitten*) by the more ovate base of the cauline leaves, with more numerous cells at their angles.

10. *H. filicinum*, *Linn.*;—*Fl. Antart.* i. 141. Stems slender, 2–3 in. high, compressed, pinnately branched, tomentose with purplish radicles. Leaves dull green, spreading, falcate or suberect, secund, cordate at the base, serrulate; nerve solid, continuous; perichætil striated. Fruitstalk 1 in.



long, smooth. Capsule cernuous, subcylindrical; operculum conical, acute. Inflorescence monœcious.—Wils. Bryol. Brit. 392. t. 26.

**Lord Auckland's** group: banks of streams, *Lyall*. A very slender form or variety, distinguished as var.  $\beta$ . in Fl. Antarct. (All cold and temperate latitudes.)

11. **H. limbatum**, *Sullivant in Proc. Am. Journ. Sc. and Art.* 183, and in *Musci of U. S. Expl. Exped.* 18. Stems 2–3 in. long, slender, flexuose, floating, sparingly branched. Leaves lax, spreading, oblong- or linear-lanceolate, acuminate, concave, keeled, serrate above; nerve stout, percurrent; apex serrated; margins thickened. Fruit unknown.

**New Zealand**: on stones in the bottom of streams (U. S. Expl. Exped.). Mitten is inclined to regard this as a state of *Isotheicum marginatum*, p. 466

#### C. HISPIDA.

12. **H. hispidum**, *Hook. f. and Wils. Fl. Antarct.* i. 140. t. 61. f. 2. Stems prostrate or pendulous from a creeping rhizome, arched, subpinnately branched above, 3–10 in. long, rigid, subhispid; branches curved, often attenuate. Leaves dark green, rigid, secund, densely imbricate, ovate below, subulate above, very long-acuminate and setaceous, somewhat plaited, quite entire; nerve stout, excurrent; perichætil smaller, ovate; nerve long, exerted. Fruitstalk short,  $\frac{1}{2}$  in. long, red, smooth, stout, flexuous. Capsule ovoid, cernuous or horizontal; operculum with a slender curved beak as long as the capsule or shorter, Calyptra small, white. Inflorescence diœcious.—*Leskea*, Mitten. *H. aristatum*, *Sullivant in Proc. Amer. Acad. Sc. and Art.* 1854.

Abundant on rocks, in streams, and throughout the island, *J. D. H.* **Lord Auckland's** group: rocks on the hills, barren, *J. D. H.*—A puzzling moss. Wilson suggests that it may be better placed in *Isotheicum*. I have followed Sullivant in placing it in section *Hispida* (Tasmania, Australia, Norfolk Island.)

13. **H. glauco-viride**, *Mitten, mss.* Very closely resembling *H. hispidum*, but nerve vanishing below the apex.—Mitten.

**Kermadec** group: Sunday Island, *Milne*. (Norfolk Island.)

14. **H. umbrosum**, *Mitten in Journ. Linn. Soc.* iv. 92 (*Leskea*). Habit and colour of *H. hispidum*, but smaller and more slender. Stems 1–2 in. long, with a few irregular branches. Leaves spreading, subsecund, ligulate and acuminate from a subovate base, minutely serrulate above; nerve stout, vanishing in the elongated apex; perichætil ovate-subulate from a broad base, 1–2-toothed on each side. Fruitstalk  $\frac{1}{2}$  in. long, red. Capsule ovoid, horizontal; operculum rostrate, as long as the capsule. Inflorescence diœcious.

**Northern** Island, *Kerr (in Herb. Mitten)*; Auckland, *Knight*.

#### D. CUPRESSIFORMIA.

15. **H. cerviculatum**, *Hook. f. and Wils. Fl. N. Z.* ii. 113. t. 91. f. 2. Stems creeping, matted,  $\frac{1}{4}$ –1 in. long, subpinnately branched; branches nearly straight. Leaves yellow-green, shining, falcate and secund, lanceolate, acuminate, serrulate at the apex, margin scarcely recurved; nerve 0; perichætil erect, ovate-lanceolate, apiculate, serrulate. Fruitstalk short,  $\frac{1}{3}$

in. long, stout, roughish. Capsule oblong, horizontal, base substrumose; annulus 0; operculum with a long slender beak. Inflorescence diœcious. —*H. leptorhynchum*,  $\beta$ . Fl. Antarct. 141. *Stereodon*, Mitten in Journ. Linn. Soc. iv. 87.

**Northern** Island: Port Nicholson, *Sinclair*; woods at Tehawera, *Colenso*. **Lord Auckland's** group, *J. D. H.* (Tasmania.)

16. **H. tenuirostre**, *Hook. Musc. Exot. t.* 111; —*Fl. N. Z.* ii. 113. Stem creeping, subpinnately branched; branches elongate, erect,  $\frac{3}{4}$ –1 in. long. Leaves pale or dark green, shining, crowded, falcate, secund, ovate-lanceolate, acuminate, concave, quite entire or minutely serrulate towards the apex; nerve 0; perichætil similar. Fruitstalk long, slender, quite smooth. Capsule eernuous, ovoid-oblong; operculum with a long slender beak. Inflorescence monœcious.

**Middle** Island: Dusky Bay, *Menzies*; Bligh's Sound, Chalky Bay, and Otago, *Lyall*, *Hector* and *Buchanan*. (Tasmania.)

17. **H. amoenum**, *Hedw. Sp. Musc. t.* 77. *f.* 6–9. Stems prostrate, vaguely and pinnately branched,  $\frac{1}{2}$ –1 in. long; branches short, their apices incurved. Leaves yellow-brown, shining, falcate and secund, lanceolate, long acuminate, concave, quite entire; cells large, pellucid at the marginal base; nerve 0; perichætil broader, entire or serrulate towards the apex. Fruitstalk  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, very slender, red. Capsule horizontal, ovoid, urceolate when dry; operculum with a slender beak as long as the capsule.

**Northern** Island: Auckland, *Knight*. (Andes, Fuegia, Australia.)

18. **H. crassiusculum**, *Bridel*; —*Fl. N. Z.* ii. 113. Stem creeping, vaguely branched, 1–2 in. long, subpinnately branched; branches short, incurved, subeuspidate. Leaves pale green, loosely imbricate, subsecund, not falcate, lanceolate, acuminate, piliferous, quite entire, concave, margins scarcely recurved; nerve 0; cells inflated at the marginal base; perichætil longer, erect. Fruitstalk short, quite smooth. Capsule ovoid-oblong, subcernuous; operculum with a long slender beak. Inflorescence monœcious. —Schwaegr. Suppl. t. 91. *H. contiguum*, Fl. Tasm. ii. 213. t. 177. *f.* 2.

**Northern** and **Middle** Islands: Auckland, *Sinclair*; Canterbury, *Sinclair* and *Haast*; Otago, *Hector* and *Buchanan*. (Tasmania, N. and S. America, Tristan d'Acunha.)

19. **H. Jolliffei**, *Mitten in Journ. Linn. Soc.* iv. 87 (*Stereodon*); —*Fl. Tasman.* ii. 213. t. 177. *f.* 1. Stems matted, 1–3 in. long, forming bright green shining patches; branches slender, with cuspidate apices. Leaves loosely imbricate, secund, not falcate, oblong or oblong-lanceolate, acuminate, quite entire or obscurely serrulate at the apex; cells at the marginal base larger and hyaline; nerve 0 or 2 obscure; perichætil similar, erecto-patent. Fruitstalk slender, 1 in. long. Capsule small, ovoid, inclined or horizontal; operculum slender, as long as the capsule.

**Northern** and **Middle** Islands, *Jolliffe*; Wangaroa, *Sinclair*; Otago, *Hector* and *Buchanan*. (Tasmania.)

20. **H. homomallum**, *C. Muell.*; —*Fl. Tasm.* ii. 213. Stems tufted, decumbent, prostrate, forming shining golden-yellow patches; branches short, flexuose. Leaves crowded, secund, slightly falcate, broadly ovate or oblong,

acuminate, very concave, quite entire, margin recurved; cells at the marginal base numerous, thick-walled, square; nerve 0; perichæatial narrow, straight. Fruitstalk short,  $\frac{1}{4}$ – $\frac{1}{3}$  in., red. Capsule narrow-oblong, suberect; operculum with a slender beak as long as the capsule.—*H. Drummondii*, Tayl. *Leskea homomalla*, Hampe, Ic. Musc. t. 6.

**Northern** Island: Bay of Islands, *J. D. H.*; Auckland, *Jolliffe*. (Australia, Tasmania.)

21. **H. molliculum**, *Sullivan*, *Mosses of U. S. Expl. Exped.* 14. t. 11. A small, slender, flaccid, pale green plant, creeping on earth; branches weak, ascending. Leaves 2-farious, secund, hardly falcate, spreading, oblong-lanceolate, acuminate, concave; margins erect, quite entire; cells at the marginal base similar to the others; nerve 0 or very short; perichæatial similar. Fruitstalk short, very slender. Capsule cernuous, small; operculum in our specimens slender, as long as the capsule.

**Kermadec** group: Raoul Island, *M'Gillivray and Milne*. (Sandwich Islands).—I have referred this plant doubtfully to *Sullivan*s, the operculum being as long as the capsule and more slender than the figure of that author, who does not however describe this organ.

22. **H. pubescens**, *Hook. f. and Wils. Fl. N. Z.* ii. 113. t. 91. f. 3. Stems creeping loosely, subpinnately branched, 1 in. long; branches rather distant, nearly straight. Leaves yellow-green, shining, incurved, loosely imbricate, scarcely secund, deltoid-ovate, acuminate, serrulate, obscurely striate when dry; nerve obscure. Fruitstalk slightly rough,  $\frac{2}{3}$  in. long. Capsule cernuous, ovoid; operculum conical, almost as long as the capsule. Calyptra hairy. Inflorescence diœcious.

**Northern** Island, *Colenso*; Auckland, *Sinclair, Knight*; Hick's Bay, *Jolliffe*. Very near the European *H. molluscum*.

23. **H. leptorhynchum**, *Bridel*;—*Fl. N. Z.* ii. 112. Stems densely tufted, creeping, pinnately branched,  $\frac{1}{4}$ –1 in. long; branches slender, matted. Leaves yellow-green, shining, falcate, secund, not circinate, twisted when dry, linear-lanceolate, acuminate, serrulate towards the apex; margin subrecurved; cells at the marginal base larger, inflated; nerve 0. Fruitstalk long, slender, smooth. Capsule oblong, nodding; operculum with a slender beak, as long as the capsule. Inflorescence monœcious.—*Schwægr. Suppl.* t. 93; *Fl. Antart.* 141, excl. var.  $\beta$ ; *Stereodon cyparoides*, *Mitten* in *Journ. Linn. Soc.* iv. 87 (not of *Bridel*.); *H. leucocytus*, *C. Muell.*

Abundant on trunks of trees throughout the **Northern** and **Middle** Islands, *Colenso*, etc., and in **Lord Auckland's** group, *J. D. H.* (Australia, Tasmania, S. America, S. Africa.)

24. **H. chrysogaster**, *C. Muell. in Linnæa*, 185.—*H. patale*, *Fl. N. Z.* ii. 112. t. 90. f. 6. Stems procumbent, 2–4 in. long, pectinately branched; branches crowded, spreading, flattened above, recurved. Leaves white or pale bright green, glossy, distichously spreading, strongly falcate, secund, almost circinate, ovate-lanceolate, long-acuminate, subserrulate at the apex; cells at the marginal base larger, collected into two yellow spots; nerve 0; perichæatial erect, setaceous, serrulate. Fruitstalk slender, 1–2 in. long, smooth. Capsule oblong-ovoid, horizontal or cernuous; operculum convex, obtuse, apiculate. Inflorescence diœcious.—*Stereodon*, *Mitten* in *Journ. Linn. Soc.* iv. 87. *H. cupressiforme*, *Fl. Antart.* 141.

**Northern** Island: common on trunks of trees, *J. D. H.*, etc.; Pelorus, *Jolliffe*. **Middle** Island: Chain-hills, Otago, *Lindsay, Hector and Buchanan*. **Campbell's** Island, *J. D. H.* **Auckland** Island, *J. D. H., Bolton*. (Tasmania, Juan Fernandez.)

25. **H. cupressiforme**, *Linn.*;—*Fl. N. Z.* ii. 111. Stems creeping or prostrate, 1–3 in. long, vaguely pinnately branched; branches incurved. Leaves pale yellow, shining, circinate falcate, secund, incurved, ovate-lanceolate, acuminate, concave, quite entire or obscurely toothed; cells enlarged at the marginal base; nerve 0; perichaetial erect, subpiliferous. Fruitstalk slender,  $\frac{1}{2}$ –1 in. long. Capsule suberect, horizontal or cernuous, subcylindric; operculum short, conical, cuspidate. Inflorescence diœcious.—*Wils. Bryol. Brit.* 397. t. 27. *H. Mossmanianum*, *C. Mueller* in *Bot. Zeit.* 1851, 565.

Common throughout the islands, *Colenso*, etc. Very variable. Wilson considers the large cells at the marginal base of the leaf a good diagnostic character. (One of the most widely diffused mosses in the world.)

26. **H. mundulum**, *Hook. f. and Wils. Fl. N. Z.* ii. 112. t. 91. f. 1. Stem 1–1 $\frac{1}{2}$  in. long, procumbent, slender, flexuous, pinnately branched; branches crowded, erecto-patent, subrecurved. Leaves very pale yellow, rather shining, falcate, secund, circinate, ovate-lanceolate below, narrowed to a long slender almost piliferous apex, quite entire; nerve 0; perichaetial shorter, erect, acuminate, subserrulate. Fruitstalk slender,  $\frac{1}{2}$  in. long, red, quite smooth. Capsule ovoid, pendulous, dark red-purple; operculum shorter than the capsule, beaked. Inflorescence monœcious.

**Middle** Island, *Lyall*.

27. **H. limatum**, *Hook. f. and Wils. Fl. Antart. Suppl.* 545. Stems pinnately branched,  $\frac{1}{4}$  in. long; branches short, incurved. Leaves pale green or yellowish, shining, crowded, secund, falcate, subcircinate, membranous, ovate at the base, thence gradually narrowed into long subpiliferous points, quite entire; nerve 0; perichaetial elongate, subsquarrose, subserrulate. Fruitstalk  $\frac{1}{2}$  in. long, quite smooth. Capsule suberect, cylindrical; operculum short, convex, hardly conical, apiculate, red. Inflorescence diœcious.—*H. terræ-Novæ*, *Brid., ß. australe*, *Fl. Antart.* 142. t. 61. f. 4.

**Campbell's** Island: on decaying wood, *J. D. H.* (Tasmania.)

28. **H. pulchellum**, *Dicks.?* Stems very slender, suberect, scarcely creeping, sparingly fastigiately branched. Leaves lax, more or less secund, slightly falcate, lanceolate, tapering from a broader base to an almost piliferous apex, quite entire; cells at the marginal base similar to the others; nerve 0; perichaetial erect. Fruitstalk 1 in. high, slender, rising from the base of the stem. Capsule nearly erect, oblong, tapering into the fruitstalk, slightly curved; operculum conical, beaked.—*Wils. Bryol. Brit.* 404. t. 25. *H. nitidulum*, *Wahlb.*

**Middle** Island: Canterbury Alps, *Sinclair and Haast*.—I have queried Mitten's determination of this moss, which differs from the European one in laxer habit, paler colour, and longer, less falcate and rather narrower leaves.—*Schimper* remarks that it is nearer *H. Muellierianum*, but distinct. (*H. pulchellum* is a native of Temp. Europe and N. America.)

29. **H. acutifolium**, *Hook. f. and Wils. Fl. Antart.* 138. t. 60. f. 5. Stems ascending, slender,  $\frac{1}{2}$ –1 in. high, sparingly fastigiately branched; branches subcompressed. Leaves pale yellowish-brown, closely imbricate,



obscurely falcate-secund, or nearly erect, oblong-lanceolate, with a long acuminate apex, quite entire, concave, nerveless; cells at the outer base larger and darker coloured. Capsule unknown.

**Campbell's** Island: growing amongst *H. chlamydophyllum* on the hills, *J. D. H.*—Sullivant (Musci of U. S. Expl. Exped. 18) suspects this to be possibly a form of *H. crinitum*, from which, however, it widely differs.

30. **H. Sandwichense**, *Hook. and Arn. Fl. N. Z.* ii. 113. Stems procumbent, 1 in. long, pinnately branched; branches short, not crowded, distichously spreading. Leaves bright yellow-green, shining, spreading somewhat distichously, falcate and secund, ovate-lanceolate, acuminate, serrulate at the apex, margin scarcely recurved; cells at the outer base a little enlarged; nerves 0 or 2, very short; perichætil larger, broader, often serrulate. Fruitstalk  $\frac{1}{2}$  in. long, quite smooth. Capsule pendulous, ovoid; operculum convex, apiculate. Inflorescence monœcious.—*H. acinacifolium*, Hampe (fide Mitten).

**Northern** Island: Bay of Islands, on trunks of trees; rare, *J. D. H.*, *Colenso*. **Kermadec** group: Sunday Island, *Milne*. (Sandwich Islands.)

#### E. PRÆLONGA.

31. **H. muriculatum**, *Hook. f. and Wils. Fl. N. Z.* ii. 108. *t.* 89. *f.* 3. Stems small, slender, procumbent, subpinnately branched, 1–2 in. long; branches short,  $\frac{1}{4}$  in. long, simple, subcompressed. Leaves spreading, ovate-lanceolate, acuminate, subserrulate, almost piliferous; nerve produced beyond the middle. Fruitstalk  $\frac{1}{3}$  in. long, rough. Capsule horizontal, oblong, curved at the base, where it joins the fruitstalk; operculum with a long beak. Inflorescence monœcious.

Var. *β*. branches flattened, leaves less acuminate, and rather twisted when dry.

**Northern** and **Middle** Islands: not uncommon in woods. Var. *β*. Bay of Islands, *J. D. H.*—Closely allied to several northern and other species. (Norfolk Island, Tasmania.)

32. **H. austrinum**, *Hook. f. and Wils. Fl. N. Z.* ii. 108. *t.* 89. *f.* 4. Stems 2–3 in. long, creeping, vaguely branched; branches 1 in. long, suberect, incurved. Leaves dark green, opaque, spreading, subsecund, ovate or ovate-cordate, acuminate, serrulate, concave; nerve faint, produced beyond the middle; perichætil erect. Fruitstalk  $\frac{1}{2}$  in. high, rough. Capsule ovoid, cernuous; operculum beaked. Inflorescence monœcious.

Var. *β*. Branches crowded, more slender; leaves smaller.

**Northern** and **Middle** islands: in woods from Auckland, *Knight*, to Akaroa, *Raoul*. Var. *β*. **Middle** Island, *Lyall*. (Tasmania, Australia.)

33. **H. remotifolium**, *Greville*;—*Fl. N. Z.* ii. 108. Stems creeping, rather slender, 1–2 in. long, subpinuately branched; branches  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, spreading. Leaves pale, glossy, spreading, cordate-ovate, acuminate, almost piliferous, serrulate; nerve produced beyond the middle; perichætil ovate-oblong, piliferous. Fruitstalk rough, 1 in. high. Capsule cernuous, broadly oblong, curved; operculum with a slender beak, almost as long as the capsule. Inflorescence hermaphrodite.—Schwægr. *Suppl.* t. 200 (fruitstalk erroneously smooth). *H. asperipes*, *Mitt.* in *Fl. Tasman.* 209, t. 176, f. 4.

**Northern Island**: in various localities, *Sinclair and Colenso*; Auckland, *Knight*.  
**Middle Island**: Otago, *Hector and Buchanan*. (Tasmania, S. America?)

## F. CONFERTA.

34. ***H. tenuifolium***, *Hedw.*—*H. confertum*, Fl. N. Z. ii. 108, not of Smith. Stems matted, small, slender, arching, prostrate and ascending, pinnately branched, 1–2 in. long; branches compressed, long or short. Leaves dark green, subsecund, ovate-cordate, acuminate, serrulate, concave; nerve produced beyond the middle; cells linear; perichæatial recurved, long-acuminate. Fruitstalk  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. high, smooth. Capsule cernuous, ovoid-oblong, curved; operculum with a long slender beak. Inflorescence monœcious.—*H. collatum*, Hook. f. and Wils. Fl. Tasm. ii. 209. t. 176. f. 5.

**Northern and Middle Islands**: common on trunks of trees, from the Bay of Islands, *J. D. H.*, to Otago, *Lyall*. (Tasmania.)—I follow Mitten in referring this to the little-known *H. tenuifolium* (which is described as having quite entire leaves); the same author thinks it is probably a large form of the European *H. confertum*.

35. ***H. elusum***, *Mitten, mss.* Stems depressed, subpinnately branched. Leaves spreading, somewhat compressed, broadly ovate, suddenly contracted to an acuminate apex, minutely serrulate above; nerve slender, produced to the middle; perichæatial ovate-subulate, with reflexed apices, nerveless. Fruitstalk red, smooth. Capsule inclined, unequal; operculum subulate, beaked. Inflorescence monœcious.

**Middle Island**: N.E. valley, Otago, *Hector and Buchanan*.—Mitten describes this as having the appearance of *H. muriculatum*, from which its smooth fruitstalk distinguishes it; and as differing from *H. tenuifolium* in its smaller size and suddenly acuminate leaves.

36. ***H. aristatum***, *Hook. f. and Wils. Fl. Tasm.* ii. 210. t. 176. f. 6. Stems small, tufted, 1–2 in. long, pinnately branched; branches slender, attenuate. Leaves dark green, not glossy, spreading, subcompressed, lax and flexuous when dry, oblong-acuminate and piliferous at the apex, serrulate, concave; margin not reflexed; nerve distinct, produced beyond the middle; perichæatial erect, acuminate. Fruitstalk 1 in. long, smooth. Capsule cernuous, areolate, oblong; annulus small, adhærent; operculum with a short beak. Inflorescence monœcious.

**Northern and Middle Islands**: Auckland, *Knight*; Saddle Hill, Otago, *Lindsay*. (Australia, Tasmania.)

## G. RUTABULA.

37. ***H. rutabulum***, *Linn.*;—*Fl. N. Z.* ii. 109. Stems rather stout, 1–3 in. long, suberect or prostrate, vaguely or subpinnately branched; branches erect, flexuous, very variable in length. Leaves pale, very shining, membranous, loosely imbricate, spreading, ovate, acuminate, concave, subsiriate, subserrulate; nerve produced beyond the middle; perichæatial strongly recurved. Fruitstalk stout, rough. Capsule ovoid-oblong, cernuous; operculum short, conical. Inflorescence monœcious.—*Wils. Bryol. Brit.* 345. t. 26; *Fl. Antaret.* i. 138.

**Northern and Middle Islands**: in woods and on rocks, probably common, Bay of Islands, *J. D. H.*; Canterbury, *Haast*; Akaroa, *Raoul*; Otago, *Hector and Buchanan*. **Campbell's Island**, *J. D. H.* (Tasmania, Europe, N. and S. America.)

38. **H. paradoxum**, *Hook. f. and Wils. Fl. Antarct.* 419. t. 155. f. 2; —*Fl. Tasm.* ii. 210. Stems 2–3 in. long, pinnately branched, creeping, loosely tufted; branches with curved tips. Leaves falcate and secund, shortly ovate-lanceolate, acuminate, strongly serrulate, striate; nerve stout, produced beyond the middle. Fruitstalk rough, brown,  $\frac{1}{2}$  in. long. Capsule ovoid-oblong, horizontal or cernuous; operculum conical, very obtuse.

**Middle Island:** Canterbury Alps, *Sinclair and Haast*; Otago, *Hector and Buchanan*. (Tasmania, Australia, Fuegia.)

39. **H. plumosum**, *Swartz*; —*Fl. N. Z.* ii. 109. Stems slender, 2–3 in. long, vaguely branched; branches suberect, rather incurved. Leaves erecto-patent, imbricate, subsecund, firm, ovate-lanceolate, concave, smooth, subserrulate at the apex; nerve produced beyond the middle; perichætil with long recurved points, nerveless. Fruitstalk  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, roughish above the middle. Capsule ovoid, subcernuous; operculum small, conical, acute. Inflorescence monœcious.—*Wils. Bryol. Brit.* 340. t. 25.

**Northern and Middle Islands:** Bay of Islands, *Cunningham, J. D. H.*; Auckland, *Knight*; Bay of Plenty, *Jolliffe*; Bligh's Sound, *Lyall*. (Europe, Asia, America.)

#### H. SERPENTIA.

40. **H. serpens**, *Linn.*; —*Fl. N. Z.* ii. 109. Stems minute, matted, creeping,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, vaguely branched; branches filiform, simple, suberect. Leaves dark green, small, loosely imbricate, spreading, erect when dry, ovate-lanceolate, acuminate, quite entire; nerve produced beyond the middle, or much shorter; cells lax; perichætil larger, sheathing, membranous; nerve obsolete. Fruitstalk red, smooth. Capsule oblong, subcernuous; operculum conical, convex, acute.—*Wils. Bryol. Brit.* 362. t. 24.

Var.  $\beta$ . *Fl. Antarct.* 138. Nerve stronger and more solid.

**Northern Island:** Hawke's Bay, in bogs, *Colenso* (barren, and hence doubtful). Var.  $\beta$ . **Lord Auckland's group**, *J. D. H.* (Abundant in many temperate climates, but not hitherto in Tasmania.)

#### I. STELLATA.

41. **H. polygamum**, *Bruch and Schimp.*—*H. nodiflorum*, *Wils.* in *Fl. N. Z.* ii. 109. Stems procumbent, vaguely subpinnately branched; branches short, slender, spreading. Leaves yellowish, firm, spreading, subsquarrose, ovate-lanceolate, acuminate, quite entire; cells narrow; nerve produced to the middle, or shorter; perichætil erect, striated, inner with subulate tips. Fruitstalk 1–2 in. long, smooth. Capsule cernuous, oblong, quite smooth; operculum conical. Inflorescence polygamous, male and female often crowded together.—*Wils. Bryol. Brit.* 365. t. 56.

**Northern Island:** bogs near Hawke's Bay, *Colenso*; Hick's Bay, *Jolliffe*. (Europe, N. America.)

42. **H. relaxum**, *Hook. f. and Wils. Fl. N. Z.* ii. 110. t. 90. f. 1. Stem procumbent, 2–4 in. long, vaguely subpinnately branched; branches long, erect, thickened at the top. Leaves yellowish, crowded, subsecund, spreading and recurved, soft, rather twisted when dry, ovate, acuminate, hardly serrulate; nerve stout, solid; cells oval. Inflorescence diœcious.

**Northern and Middle Islands:** probably common, *Colenso*; Wellington, *Lyall*, Akaroa, *Raoul*; Port Cooper, *Lyall*.

43. **H. decussatum**, *Hook. f. and Wils. Fl. N. Z.* ii. 110. *t.* 90. *f.* 2. Stems rather stout, 3–4 in. long, procumbent, pinnately branched; branches short,  $\frac{1}{3}$  in. long, simple, crowded, often recurved. Leaves yellowish or reddish, spreading, squarrose and recurved, not twisted when dry, ovate, long-acuminate, almost quite entire; nerve continuous nearly to the apex. Fruit unknown. Inflorescence diœcious.

**Northern** and **Middle** Island: East Cape, *Sinclair*; Cape Turnagain and Hawke's Bay, *Colenso*; Banks's Peninsula, *Jolliffe*. (Tasmania.)

#### J. ACICULARIA.

44. **H. aciculare**, *Labill.*;—*Fl. N. Z.* ii. 110. Stems large, stout, 2–10 in. long, vaguely branched; branches elongate, simple. Leaves crowded, spreading and squarrose, undulated, pale green, large, ovate, long-acuminate, serrate towards the apex, nerveless; perichætil small, oblong, abruptly piliferous. Fruitstalk 1–2 in. high, stout, purple. Capsule 8-angled, subcylindric; operculum longer than the capsule, with a slender beak. Calyptra large, chesnut-brown, coriaceous. Inflorescence diœcious; male axillary red.—*Schwægr. Suppl. t.* 92.

Abundant in woods throughout the **Northern** and **Middle** Islands, and in **Lord Auckland's** group and **Campbell's** Island. (Tasmania, Australia, temp. S. America, Sandwich Islands.)—One of the largest and commonest N. Z. mosses.

45. **H. densifolium**, *Brid. Sp. Musc.* ii. 204. Habit and appearance of *H. aciculare*, but leaves more crowded, all of their leaves strongly refracted from the middle, more shortly acuminate, and very finely serrulate.

**Northern** Island: Wellington, *Stephenson* (*Herb. Mitten.*) (Tristan d'Aeunha.)

#### K. COCHLEARIFOLIA.

46. **H. cochlearifolium**, *Schwægr. Suppl. t.* 88;—*Fl. N. Z.* ii. 111. Stems long, robust, prostrate, almost creeping, 2–4 in. long, cylindrical, sparingly branched; branches short, 1 in. long, erect, stout. Leaves pale green, glossy, spreading, imbricate, orbicular, obtuse, quite entire, concave and almost hemispherical; nerve 0; cells narrow; perichætil sheathing. Fruitstalk  $\frac{3}{4}$  in. long, smooth, arcuate at the top. Capsule subcernuous, ovoid; operculum conical, half as long as the capsule. Inflorescence diœcious.—*Fl. Antart. i.* 139. *H. flexile*, *Hook. Musc. Exot. t.* 10 (not of Swartz).

Var. *B.* Stems more or less pendulous; branches shorter; fruitstalk very short, stout; capsule more rounded; operculum acuminate.

Throughout the **Northern** and **Middle** Islands from the Bay of Islands, *Cunningham*, to Dusky Bay, *Menzies*, most abundant. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (Tasmania, Australia, Chiloe.)

47. **H. clandestinum**, *Hook. f. and Wils. Fl. N. Z.* ii. 111. *t.* 90. *f.* 3. Stem procumbent, 2–3 in. long, cylindric, vaguely sparingly branched; branches  $\frac{1}{4}$ –1 in. long, straight or incurved. Leaves pale greyish-green, glossy, spreading, imbricate, oblong-orbicular or broadly-oblong, very obtuse, cordate at the base, very concave like a boat, scarcely toothed; nerve 0; cells narrow; perichætil subsquarrose. Fruitstalk short,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, smooth. Capsule cernuous or horizontal, oblong-cylindric, smooth; operculum short,



conical. Inflorescence monœcious; male fl.: amongst or upon the leaves of the fertile stem.

**Middle** Island: moist forests, Port William, *Lyall*; Chain Hills, Otago, *Lindsay*; Nelson, *Travers*; Canterbury, *Haast*. (Tasmania, Australia.)

48. **H. chlamydophyllum**, *Hook. f. and Wils. Fl. Antarct. t. 61. f. 1*; —*Fl. N. Z. ii. 111*. Stems prostrate, 1–2 in. long, sparingly vaguely branched, cylindrical; branches long, erect, simple, cuspidate. Leaves pale green, shining, spreading, imbricate, orbicular-subquadrate, rounded at the apex, auricled at the base, quite entire, concave and inflated; nerves 1 or 2, very short; cells narrow-oblong; perichætil erect. Fruitstalk slender,  $1\frac{1}{2}$  in. long, smooth. Capsule cernuous or horizontal, narrow, ovoid-oblong; operculum short, beaked. Inflorescence monœcious.—*H. auriculatum*, Montagne.

**Northern** Island: abundant in moist woods in the interior, *Colenso*. **Middle** Island: Dusky Bay, *Menzies*; Nelson, *Travers*; Canterbury, *Haast*; Otago and Port William, *Lyall*, *Hector* and *Buchanan*. **Campbell's** Island: barren, *J. D. H.* (Tasmania, Fuegia.)

49. **H. inflatum**, *Hook. f. and Wils. Fl. N. Z. iii. 111. t. 90. f. 5*. Stems large, stout, tumid, erect, 2–3 in. high and  $\frac{1}{8}$  in. diameter, very sparingly branched. Leaves bright, shining, yellow, crowded, large and inflated, closely imbricate, suberect, oblong, apiculate or acuminate, quite entire, very concave, much undulated; apex recurved; nerve 0.

**Northern** Island: Manawaki, *Colenso*. **Middle** Island: Nelson, *Travers*; Murray Bay, *Jolliffe* (barren). A very remarkable moss, of which the genus cannot be determined till the fruit is discovered.

50. **H. vagum**, *Hornschuch*. Stems ascending, stout, much vaguely branched. Leaves broadly ovate, shortly acuminate, almost nerveless; perichætil long, sheathing, more or less reflexed. Fruitstalk elongate, erect, smooth, flexuous. Capsule oblong, nearly horizontal, purple; operculum conical, subulate, straight.

**Northern** Island, *Kerr* (in *Herb. Mitten*). I have seen no New Zealand specimens. (Australia.)

51. **H. divulgum**, *Hook. f. and Wils. Fl. N. Z. ii. 111. t. 90. f. 4*. Stems very long (2–5 in.), filiform, slender, cylindrical, vaguely sparingly branched; branches rigid, suberect, incurved or straight. Leaves grey-green, hardly glossy, spreading, loosely imbricate, rounded-obovate, obtuse or subacute, minutely serrulate; nerve reaching halfway; cells punctiform; perichætil squarrose. Fruitstalk  $\frac{1}{3}$ – $\frac{1}{2}$  in. long. Capsule cylindric-ovoid, cernuous; operculum conical, acuminate. Inflorescence diœcious.—*Fl. Tasman. ii. 211*.

**Northern** Island: Auckland, *Knight*. **Middle** Island: Nelson, *Travers*; Canterbury, *Haast*; Port Cooper and Banks's Peninsula, *Jolliffe*, *Lyall*; Otago, *Hector* and *Buchanan*. Similar to *H. clandestinum*, but with nerved less-obtuse leaves and punctiform cells. (Tasmania, Australia.)

#### L. DISTICHOPHYLLA.

52. **H. extenuatum**, *Bridel*.—*H. crinitum*, *Hook. f. and Wils. Fl. N. Z. ii. 114. t. 91. f. 4*. Stems procumbent, 2–5 in. long, much pinnately branched; branches distant,  $\frac{1}{2}$  in. long, flattened, acute. Leaves pale green, shining, distichous, erecto-patent, subcompressed, concave, ovate-oblong, obtuse, with a piliferous point as long as themselves, subserrulate; nerve 0;

perichaetial nearly similar. Fruitstalk 1-2 in. long, slender, smooth. Capsule ovoid-oblong, cernuous; operculum conical. Inflorescence diœcious.—Sullivant, Musci of U. S. Expl. Exped. 18.

**Northern** Island: not uncommon in woods, *A. Cunningham*, *Colenso*, etc. **Middle** Island: Pelorus harbour, *Jolliffe*; Nelson, *Travers*; Otago, *Hector and Buchanan*. **Lord Auckland's** Island, *United States Expl. Exped.* (Tasmania, Australia.) Our *H. crinitum* is hardly different from *H. extenuatum*, Bridel, though smaller, with rather larger points to the leaves (the figure in Fl. N. Z. represents it as too large and robust.) C. Mueller describes *H. extenuatum* as a native of N. Zealand, at Kiapara (Bot. Zeit. 1851, 566); there are a few barren scraps of it amongst my own Bay of Island collections, but I cannot distinguish the two species except as forms.

53. **H. politum**, Hook. f. and Wils.; Fl. Antarct. t. 154. f. 2.—Fl. N. Z. ii. 114. Stems suberect or prostrate, 1 in. long, sparingly branched, flattened; branches  $\frac{1}{4}$  in., acute. Leaves bright green, shining, closely imbricate, distichous, spreading, oblong, compressed, keeled, very concave, acute, with subpiliferous apices, quite entire; nerve 0; cells very minute; perichaetial much shorter, ovate, erect, long acuminate. Fruitstalk 1 in. high, smooth. Capsule inclined, slender, narrow oblong, with an attenuated apophysis; operculum conical, beaked, half as long as the capsule. Inflorescence diœcious.—*Phyllogonium callichroum*, Montagne, not of Bridel.

**Northern** Island, *Colenso* (scraps very barren). **Middle** Island: Otago, *Hector and Buchanan*. (Australia, Tasmania, Andes, Fuegia, Kerguelen Land, S. Africa.)

54. **H. polystictum**, Mitten, mss. Stem procumbent, flexuous, compressed, pinnately branched, 1-1 $\frac{1}{2}$  in. long. Leaves pale yellow, shining, compressed, distichously spreading, complicate, broadly ovate, shortly acuminate, serrulate; nerve 0; cells elongate, very narrow, each with a row of about 5 papillæ.—Mitten.

**Northern** Island: On a Lichen (*Sticta*), *Knight*. Characterized by Mitten, who picked it from out of some Lichens sent by Dr. Knight. The leaves are hardly distichous, being imbricated all round, though the branches are compressed and the lateral leaves spread 2-fariously. The character of the cells is a very remarkable one, and compared by its author to that of the Indian *H. Nipalense* and S. American *H. planum*; it requires a high power of the microscope to detect it.

55. **H. denticulatum**, Linn. Stems prostrate, sparingly branched, 1 in. long; branches short, subfascicled. Leaves complanate, light green and glossy, inserted all round the stem but 2-farious, not undulate, concave, obliquely ovate, subacute or with a short tapering entire or serrulate apex; margin recurved below; nerves 2, short, basal. Fruitstalk basal, 1 in. long, stout, reddish. Capsule cylindric-oblong, inclined or horizontal; operculum conical, subacute. Inflorescence monœcious.—Wils. Bryol. Brit. 407. t. 24; *H. Donianum*, Smith.

**Middle** Island: Hopkin's River, in Beech forests, alt. 3-4000 ft., *Haast*. (Europe, N. America, Himalaya.) I follow Mitten in referring this plant to the European *H. denticulatum*, which is a very variable plant. The leaves of the New Zealand form are shorter, broader, less acute, and less very obscurely serrulate.

The European *H. riparum* is stated (Fl. N. Z. ii. 109) to be possibly a native of New Zealand, from very imperfect specimens collected at Hawke's Bay by Colenso. I do not now find the specimens, which were very small and incomplete, and I think that the identification is better suppressed.

64. **OMALIA**, Bridel.

Small, bright green, shining, creeping, stoloniferous, monœcious mosses; stems quite prostrate or suberect, pinnately branched; branches flat. Leaves distichously imbricated, often subsecund, but inserted 8-fariously, flattened, the lateral oblique, unsymmetrical, vertical, inflexed at the base on one side; nerve short or 0; cells very minute, narrow. Fruitstalk lateral, long, slender, curved at the tip. Capsule ovoid, drooping; annulus obscure; peristome of *Hypnum*. Operculum beaked. Calyptra cucullate.

A small genus, found in various temperate climates, on trees and rocks.

\* *Leaves dark green, serrulate.*

Leaves obovate-oblong or spatulate . . . . . 1. *O. pulchella*.  
Leaves linear-oblong, undulate when dry . . . . . 2. *O. oblongifolia*.

\*\* *Leaves pale glossy green, quite entire.*

Leaves oblong, with a flat falcate point; nerve 0 . . . . . 3. *O. falcifolia*.  
Leaves rounded-obovate, nerved . . . . . 4. *O. auriculata*.

1. ***O. pulchella***, *Hook. f. and Wils. Fl. N. Z.* ii. 114. *t.* 91. *f.* 5. Stems prostrate or inclined from a creeping rhizome, rigid, much pinnately branched,  $\frac{1}{2}$ –1 in. high; branches  $\frac{1}{4}$  in. long. Leaves light green, not glossy, crowded, complanate, distichous, oblong or rounded-obovate or spatulate, apiculate, serrulate; nerve stout, reaching halfway; perichaetial squarrose. Fruitstalk smooth,  $\frac{1}{3}$  in. high, arcuate at the top. Capsule nodding, broadly ovoid; operculum with a curved beak, as long as the capsule. Calyptra white. Inflorescence dioecious.—*Hookeria punctata*, nob. in Lond. Journ. Bot. 1844. 550.

**Northern and Middle Islands:** on trees, probably common; Bay of Islands, *J. D. H.*; Auckland, *Knight*; Port Nicholson and Milford Sound, *Lyall*. (Norfolk Island.)

2. ***O. oblongifolia***, *Hook. f. and Wils. Fl. N. Z.* ii. 115. *t.* 91. *f.* 6. Similar in habit and most characters to *O. pulchella*, but the branches are narrower; leaves deeper green, undulate when dry, longer, linear-oblong, less serrulate, and the nerve is produced beyond the middle.—*Hookeria punctata*, var.  $\beta$ , nob. in Lond. Journ. Bot. 1844. 550.

**Northern Island:** Bay of Islands, with *O. pulchella*, *J. D. H.*; Auckland, *Knight* (drawing only), *Sinclair*.

3. ***O. falcifolia***, *Hook. f. and Wils. Fl. N. Z.* ii. 115. *t.* 92. *f.* 1. Habit of *O. pulchella*, but more simple; branches much broader,  $\frac{1}{8}$  in. across. Leaves pale green, glossy, crowded, oblong, with a broad flat falcate obtuse apex, quite entire; nerve 0; perichaetial long, erect, narrow. Fruitstalk very slender,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, arched at the top, smooth. Capsule oblong, horizontal or nodding; operculum short, conical. Inflorescence dioecious.—*Hypnum falcifolium*, nob. in Lond. Journ. Bot. 1844, 554.

**Northern Island:** Bay of Islands, *Cunningham*; Auckland, *Sinclair*, *Jolliffe*; Port Nicholson, *Lyall*. (Tasmania.)

4. ***O. auriculata***, *Hook. f. and Wils. Fl. N. Z.* ii. 115. *t.* 92. *f.* 4. Stems creeping, broad, 2-pinnately branched, 1–2 in. long and broad; secondary branches broad, short. Leaves pale yellow-green, glossy, sub-

second, obovate-rotundate, apiculate, concave, quite entire, auricled at the base; nerve produced to the middle, sometimes forked. Fruit unknown.

**Northern** Island: Auckland, on trees, *Knight, Sinclair*.

## 65. RHIZOGONIUM, Bridel.

Stems or branches erect, from a creeping rhizome; tufted, simple, rarely branched, rigid, often compressed. Leaves rigid, distichous or imbricate all round, simply or doubly spinulose, serrate; cells very lax, minute; nerve stout. Fruitstalk lateral, from the bases of the stems, rarely from the side, slender, long. Capsule inclined, suberect or nodding; peristome of *Hypnum*. Operculum usually beaked. Calyptra subulate, cucullate.

Tufted erect mosses, often very beautiful, common in tropical and subtropical and southern temperate forests.

### A. *Leaves distichous.*

#### a. *Leaves simply toothed or serrate or quite entire.*

- |  |                               |
|--|-------------------------------|
| Leaves ovate-oblong, subobtuse; nerve vanishing below the serrulate apex . . . . . | 1. <i>R. distichum</i> .      |
| Leaves ovate-oblong, denticulate; nerve excurrent . . . . .                        | 2. <i>R. novæ-Hollandiæ</i> . |
| Leaves oblong-lanceolate, quite entire; nerve excurrent . . . . .                  | 3. <i>R. pennatum</i> .       |

#### β. *Leaves doubly serrulate.*

- |  |                         |
|--|-------------------------|
| Leaves ovate-lanceolate, acuminate; nerve continuous . . . . . | 4. <i>R. bifarium</i> . |
|--|-------------------------|

### B. *Leaves spreading all round the stem, not distichous.*

- |   |                            |
|---|----------------------------|
| Leaves spreading, linear-subulate . . . . .                           | 5. <i>R. spiniforme</i> .  |
| Leaves erecto-patent, lanceolate-subulate, twisted when dry . . . . . | 6. <i>R. mnioides</i> .    |
| Leaves spreading, linear-lanceolate . . . . .                         | 7. <i>R. subbasilare</i> . |

1. **R. distichum**, *Bridel*;—*Fl. N. Z.* ii. 115. Stems  $\frac{1}{2}$  in. high. Leaves dark green, distichous, coriaceous, ovate-oblong, rather obtuse, toothed at the apex; margin not thickened; nerve stout at the base, vanishing below the apex. Fruitstalk stout, 1 in. high. Capsule horizontal, oblong; operculum conical, beaked. Inflorescence diœcious.—*R. Muelleri*, *Hamp.* in *Linnæa*; *Hypnum*, *Schwæg.* *Suppl.* t. 87.

**Northern** and **Middle** Islands: common on stumps of trees, etc., *Sinclair*, etc. (*Tasmania* and *Australia*.)

2. **R. novæ-Hollandiæ**, *Bridel*;—*Fl. N. Z.* ii. 116. Stems slender,  $\frac{1}{2}$ –1 in. high. Leaves glossy, yellow-green, pellucid, distichous, often second, rigid, oblong-ovate, acuminate, denticulate, margin scarcely thickened; nerve excurrent; cells rather large. Fruitstalk 1 in. high. Capsule horizontal, oblong, pale red; annulus large; operculum beaked, nearly as long as the capsule. Inflorescence diœcious.—*Leskea*, *Schwæg.* *Suppl.* t. 83; *Fl. Ant.* i. 136.

**Northern** and **Middle** Islands: common on wood. **Lord Auckland's** group (*barren*), *J. D. H.* (*Tasmania* and *Australia*.)

3. **R. pennatum**, *Hook. f. and Wils. Fl. N. Z.* ii. 116. t. 92. f. 2. Stems 1 in. high, very slender and elegant. Leaves pale yellow-green, shining, pellucid, spreading, distichous, oblong-lanceolate, acuminate; margin thickened; nerve excurrent, stout. Fruitstalk 1 in. high. Capsule suberect,



small, almost turbinate, annulate; operculum conical, beaked, nearly as long as the capsule. Inflorescence diœcious.

**Middle Island:** on trees, Dusky Bay, *Menzies*; Port Preservation, *Lyall*.

4. **R. bifarium**, *Schimper in Bot. Zeit.* 1844, 125;—*Fl. N. Z.* ii. 116. Stems  $\frac{1}{2}$ –1 in. high, slender, branched above; branches few, subfascicled, slender, curved, rachis flexuous. Leaves dull green, distant, spreading, distichous, rigid, ovate-lanceolate, acuminate; margin more or less thickened, doubly-serrate; nerve solid, continuous. Fruitstalk from the middle of the stem, curved at the top. Capsule small, horizontal, ovoid; operculum conical, beaked, shorter than the capsule.—*Hypnum*, Hook. Musc. Exot. t. 57, Fl. Antarct. i. 137. *Trachyloma*, Mitten.

**Northern and Middle Islands:** common in forests on stumps of trees, etc., *Menzies*, etc. **Chatham Island**, *W. Travers*. **Lord Auckland's group**, *J. D. H.* (Tasmania.)

5. **R. spiniforme**, *Bruch*;—*Fl. N. Z.* ii. 116. Stems rigid, 1–3 in. high, stout, unbranched. Leaves yellow-brown or reddish, loosely imbricate, spreading, rigid, linear-subulate; margin thickened, doubly spinulose-serrate on the edges and keel; nerve stout, excurrent. Fruitstalk basilar. Capsule horizontal, oblong, arcuate; operculum beaked.—*Hypnum*, Linn.; Hedwig Sp. Musc. iii. t. 25.

Var.  $\beta$ . Stems more slender; leaves shorter.—Fl. Antarct. i. 137. *R. Hookeri*, C. Muell. in Bot. Zeit. 1851, 547.

**Northern Island:** Bay of Islands, *Cunningham*. **Kermadec group**, *M. Gillivray*, Var.  $\beta$ . **Middle Island:** Queen Charlotte's Sound, *Jolliffe*. **Lord Auckland's group** and **Campbell's Island:** on rocks, barren, *J. D. H.* (Most tropical and temperate southern latitudes.)

6. **R. mnioides**, *Hook. f. and Wils. Fl. N. Z.* ii. 116. Stems  $\frac{1}{2}$ –1 in. long. Leaves dull green, lurid, erecto-patent, twisted when dry, lanceolate-subulate, decurrent at the base; margin narrowly thickened, doubly serrate; nerve solid. Fruitstalk basilar,  $1\frac{1}{2}$  in. long. Capsule subcernuous, ovoid; operculum beaked.—*R. Mossmanianum*, C. Muell. in Bot. Zeit. 1851, 547. *Hypnum*, Hook. Musc. Exot. t. 77. *H. subbasilare*, Schwægr. Suppl. t. 256. (not of Hooker).

**Northern Island:** mountains of the interior, *Colenso*; Auckland, *Knight*; Port Nicholson, *Sinclair*. **Middle Island:** Dusky Bay, *Menzies*, *Lyall*. (Tasmania, Andes, Fuegia.)

7. **R. subbasilare**, *Schimper in Bot. Zeit.* 1844, 125. Branches erect, compressed, simple. Leaves subbifarious or subsecund but not distichous, erecto-patent, lax, linear-lanceolate, or linear-ligulate, acuminate, pellucid, serrulate; nerve vanishing below the apex; cells lax; perichætil minute, nerveless. Fruitstalk basilar, flexuous. Capsule cylindric-oblong, cernuous or horizontal; operculum conical. Inflorescence monœcious.—Fl. Tasman. ii. 216. *Hypnum*, Hook. Musc. Exot. t. 9. *H. mnioides*, Schwægr. Suppl. t. 257, not of Hooker.

**Middle Island:** Canterbury, on shaded rocks, *Travers*; Otago, Lammermuir hills and Waipori Creeks; *Hector and Buchanan*. (Tasmania, Fuegia.)

## 66. HYMENODON, Hook. f. and Wils.

A small elegant diœcious moss, with the habit of *Rhizogonium*. Leaves

distichous, oblong, piliferous, papillose; cells rounded, minute. Fruitstalk slender, lateral from near the base of the stem. Capsule suberect; peristome of 16 narrow, subulate, membranous equidistant fugacious teeth, cohering by their tips, and united by a narrow basal membrane. Operculum beaked. Calyptra split down one side. Inflorescence dioecious.

A small tropical genus, found in New Zealand, Java, and Brazil, on trunks of trees, etc.

1. **H. piliferus**, *Hook. f. and Wils. Fl. N. Z.* ii. 117. *t.* 92. *f.* 3. Stems quite simple, erect,  $\frac{1}{3}$  in. high. Leaves brittle, light glaucous-green, not shining, moistening slowly, laxly distichously imbricate, spreading, elliptic-oblong, flat, with long piliferous points, crenulate; nerve vanishing; perichætal lanceolate, acuminate, erect. Fruitstalk 1 in. long and slender, red. Capsule contracted at the mouth; teeth white, fugacious, faintly striate longitudinally and transversely. Calyptra small, white.—? *Hypnum Mougeotianum*, A. Rich.; *Fl. N. Z.* 57.

**Northern** and **Middle** Islands: Bay of Islands, on trunks of *Cyathea dealbata*, *J. D. H.*, etc.: Wangaroa and Auckland, *Jolliffe*; Otago, *Hector* and *Buchanan*. (Tasmania, Australia.)

## 67. HYOPTERYGIUM, Bridel.

(Including *LOPIDIUM* and *CATHAROMNION*.)

Rhizome creeping on trees; stems erect, tree-like, 1-2-3-pinnately branched, flattened. Leaves 3-ranked, the lateral vertical and oblique; dorsal dissimilar, smaller, appressed to the stem, stipule-like; nerve produced to the apex, or vanishing; cells minute. Fruitstalk lateral, produced underneath the leaves, curved at the top. Capsule suberect, cernuous or pendulous, straight, annulate; peristome of *Hypnum* or *Leskea*, outer sometimes wanting. Operculum convex, beaked. Calyptra coriaceous, conical-subulate, usually dimidiate.

Tropical and south temperate mosses, abounding in damp woods, exceedingly pretty in habit; forming matted tufts in vegetable soil and on trees. Branches often radiating from the top of the stem.

I. HYOPTERYGIUM.—Stem 2-3-pinnately branched above, there orbicular or deltoid in outline; branches radiating. Fruitstalk rather long. Capsule pendulous.

a. *Leaves not mixed with bristles.*

\* *Branches 3-pinnate* . . . . . 1. *H. filiculæforme*.

\*\* *Branches 2-pinnate.*

- |  |                              |
|--|------------------------------|
| Fruitstalk stout. Operculum conical, acuminate. Inflorescence monœcious . . . . .                        | 2. <i>H. viridulum</i> .     |
| Fruitstalk slender. Operculum subulate, beaked, as long as the capsule. Inflorescence diœcious . . . . . | 3. <i>H. oceanicum</i> .     |
| Leaves decurved; dorsal with a continuous nerve . . . . .  | 4. <i>H. novæ-Zelandiæ</i> . |
| Leaves ovate, acute; dorsal with the nerve vanishing beyond the middle . . . . .                         | 5. <i>H. discolor</i> .      |
| Leaves glaucous; dorsal orbicular-ovate, acuminate; nerve produced towards the apex . . . . .            | 6. <i>H. glaucum</i> .       |

β. *Leaves with bristles intermixed.*

- |   |                             |
|---|-----------------------------|
| Leaves spinulose-serrate . . . . .            | 7. <i>H. tamariscinum</i> . |
| Leaves slightly toothed at the apex . . . . . | 8. <i>H. rotulatum</i> .    |

II. CATHAROMNION.—Stem elongate, pinnately branched above. Fruitstalk short. Peristome single (outer absent). Leaves intermixed with bristles.

Leaves ciliate . . . . . 9. *H. ciliatum*.

III. LOPIDIUM.—Stem elongate, pinnately branched above. Fruitstalk short. Capsule inclined or cernuous. Peristome double.

Fruitstalk stout, smooth . . . . . 10. *H. concinnum*.

Fruitstalk slender, rough . . . . . 11. *H. Struthiopteris*.

1. *H. filiculæforme*, Bridel;—*Fl. N. Z.* ii. 117. Stems erect, from a creeping rhizome, naked below, 1–2 in. high, 3-pinnately radiatingly branched like a small fern above, deltoid or broadly ovate in outline; branches numerous. Leaves small, deep green, distichous, spreading, obliquely ovate-cordate, acuminate, subserrulate; nerve vanishing; dorsal orbicular, apiculate. Fruitstalk short,  $\frac{1}{2}$  in. long. Capsule ovoid, pendulous; operculum beaked, nearly as long as the capsule. Calyptra dimidiate. Inflorescence diœcious.—*Hypnum*, Schwægr. Suppl. t. 281 A.

**Northern and Middle Islands:** common on stumps of trees, etc., from the Bay of Islands, *J. D. H.*; to Otago, *Lyall*.

2. *H. viridulum*, Mitten, *mss.*—*H. rotulatum*, *Fl. N. Z.* ii. 118, not *Hypnum rotulatum*, Hedwig. Stems short, bright green, 2-pinnately branched; branches arranged in a deltoid form. Leaves on the main stem broadly ovate, acute, quite entire; nerve vanishing beyond the middle, on the branches similar, serrulate; dorsal suborbicular, apiculate, with the nerve continuous or ceasing below the apex; cells oblong-hexagonal; perichætil short, ovate, acuminate. Fruitstalk red. Capsule horizontal or pendulous; operculum conical, acuminate. Inflorescence monœcious.

**Northern and Middle Islands:** Wellington, *Stephenson*; Wangaroa and Akaroa, *Kerr* (in *Herb. Mitten*).—The above is as described by Mitten, who observes that this is a soft green moss with more slender branches than *H. novæ-Zelandiæ*, and leaves with larger cells that have acute ends. In appearance it comes nearest *H. discolor*, but it is smaller, with different inflorescence.

3. *H. oceanicum*, Mitten, *mss.* Stems short,  $\frac{1}{6}$ – $\frac{1}{3}$  in. high, expanding into a rounded-triangular green frond,  $\frac{1}{2}$  in. broad. Leaves on the primary branches ovate-oblong, apiculate, slightly serrulate, margined; nerve slender, vanishing beyond the middle; upper cells rounded, lower oval, pellucid; leaves of branchlets more oblong and denticulate; dorsal leaves small, orbicular, denticulate; nerve excurrent; perichætil erect, oblong, subulate-acuminate, quite entire, nerveless. Fruitstalk long. Capsule pendulous, oblong, rugose at the base; operculum with a subulate beak as long as the capsule. Inflorescence monœcious.—Mitten.

**Kermadec group:** Sunday Island, *Mitne* and *M'Gillivray*.—Very similar to *H. viridulum*, but the fruitstalk is much longer and more slender. (Norfolk Island.)

4. *H. novæ-Zelandiæ*, *C. Muell. in Bot. Zeit.* 1851, p. 562.—*H. Smithianum*, Hook. f. and Wils. *Fl. N. Z.* ii. 118. Stems 1–2 in. high; branches arranged in a deltoid form. Leaves pale yellow-green, firm, more or less decurved, distichous, orbicular-ovate, apiculate, margin thickened, denticulate at the apex, rather concave; nerve stout, continuous; dorsal orbicular, acuminate, with a stout continuous nerve; perichætil lanceolate,

acuminate. Fruitstalk reddish,  $\frac{1}{2}$  in. long. Capsule pendulous; operculum beaked. Calyptra dimidiate. Inflorescence diœcious.—*Hookeria rotulata*, Smith in Linn. Trans. ix. 279 (not *Leskea rotulata* of Hedwig).

Abundant throughout the islands, at the roots of trees, etc., *Menzies*, etc. (Tasmania, Australia.)

5. **H. discolor**, *Mitten*, *mss.* Habit of *H. novæ-Zelandiæ*, but rather larger, not turning yellow when dry; branches recurved at the apex. Leaves on the stem broadly obliquely-ovate, subcordate, acute, serrulate; nerve vanishing at the middle, or the branches broader upwards, with longer nerve; dorsal leaves on the stem orbicular, acuminate with the short nerve, on the branches serrulate above with percurrent nerve; perichætil small, ovate, acuminate. Fruitstalk red. Capsule ovoid, horizontal; operculum with a subulate beak. Inflorescence diœcious.

**Northern** Island: Auckland, *Knight*, *Jupp*; Kiapara, *Mossmann*.

6. **H. glaucum**, *Sullivant*, *Musci of U. S. Expl. Exped.* 26.—*H. Smithianum*,  $\beta$ . Fl. N. Z. ii. 118. A very small species; stems tufted,  $\frac{1}{4}$  in. high; branches forming a nearly orbicular crown, pale glaucous yellow-green, decurved. Leaves closely imbricate, very deflexed, broadly ovate-acuminate or apiculate, obscurely serrulate; nerve produced halfway or more; dorsal large compared with others, orbicular, abruptly acuminate, with the nerve continuous. Fruitstalk stout, arcuate. Capsule ovoid, cernuous; operculum with a slender beak, nearly as long as the capsule.

**Northern** Island: common at the roots of trees, from the Bay of Islands, *A. Cunningham*, etc., southwards.

7. **H. tamariscinum**, *Sullivant*, *Musci of U. S. Expl. Exped.* 26.—*H. setigerum*, Hook. f. and Wils. Fl. N. Z. ii. 118. Stems 2 in. high, branched as in *H. rotulatum*. Leaves yellow-green, rather glossy, mixed with small bristles, distichous, ovate-acuminate, spinulose-serrate; nerve vanishing; dorsal ovate, more acuminate, spinulose-ciliate. Fruitstalk very stout,  $\frac{1}{2}$  in. high; purplish, suddenly deflexed at the top. Capsule ovoid, pendulous, pale, abrupt and tubercled at the base; annulus distinct; operculum yellow, beaked, as long as the capsule. Calyptra not dimidiate. Inflorescence diœcious.—*Hypnum setigerum*, Palisot. *Leskea tamariscina*, Hedwig, Sp. Musc. t. 51 (not *Hypnum tamarisci* of Swartz); Fl. Antaret. i. 136.

Abundant throughout the islands, *Cunningham*, etc. **Lord Auckland's** group, *J. D. H.* (barren).—Sullivant restores the name of *tamariscinum* to this plant, it being identical with Hedwig's figure and description of *Leskea tamariscina*.

8. **H. rotulatum**, *Hedwig* (*Leskea*), not of Fl. N. Z. ii. 118. Stem short, naked below, 2-pinnately branched in a radiating manner above, there orbicular. Leaves mixed with a few setæ, dull green, not crowded, distichous, spreading, crisped or undulate when dry, orbicular-ovate; margin thickened, slightly toothed at the apex; nerve vanishing above halfway; dorsal orbicular, apiculate; nerve very short; perichætil ovate-lanceolate, concave, setulose on the back and apices, acuminate. Fruitstalk  $\frac{1}{2}$  in. long. Capsule pendulous; neck tubercled; operculum beaked. Inflorescence monœcious.—*Leskea*, Hedwig, Sp. Musc. t. 51.



**Northern** Island: Wangaroa, Kerr (in Herb. Mitten).—Mitten refers the *H. rotulatum* of Fl. N. Z. to *H. viridulum*.

9. **H. ciliatum**, Bridel.—*Catharomnion*, Fl. N. Z. ii. 119. Stems 1 in. high, naked below, and covered with matted radicles, pinnately branched above; branches crowded, alternate. Leaves pale green, hoary (from the long cilia), mixed with setæ, distichous, orbicular-ovate, acuminate, long-ciliate; nerve vanishing; dorsal much smaller, ovate-lanceolate, acuminate, ciliate. Fruitstalk very short,  $\frac{1}{4}$  in. long, purplish, stout. Capsule nearly erect, oblong, somewhat unequal, reddish-brown; peristome large, single; operculum beaked. Calyptra mitriform, inflexed, and laciniate at the base. Inflorescence diœcious.—*Pterigynandrum*, Hedw. Sp. Musc. t. 17.

**Northern** and **Middle** Islands: common in forests, on the ground, from the Bay of Islands, J. D. H., to Nelson, Travers. (Tasmania.)

10. **H. concinnum**, Bridel.—*Lopidium*, Fl. N. Z. ii. 119. Stems 1–3 in. high, naked below, pinnately branched above, then erect; ramification ovate-oblong in outline. Leaves yellowish or yellow-green, distichous, crowded, oblong-ligulate, acuminate, margin thickened, serrulate at the apex; nerve subcontinous; dorsal more dilated at the base; cells very small, roundish; perichæial nearly entire; nerve nearly continuous. Fruitstalk  $\frac{1}{8}$  in. long, stout, thickened upwards, scarcely longer than the perichæial leaves, smooth. Capsule suberect; operculum conical-subulate, nearly as long as the capsule. Calyptra conical-subulate. Inflorescence diœcious.—*Leskea*, Hook. Musc. Exot. t. 34; Fl. Antarct. i. 136.

**Northern** and **Middle** Islands: Bay of Islands, Wilkes's Expedition; Nelson, Travers; Dusky Bay, Menzies; Otago, Hector and Buchanan. **Lord Auckland's** group: on rocks, J. D. H.

11. **H. Struthiopteris**, Bridel.—*Lopidium pallens*, Fl. N. Z. ii. 119. Habit and ramification of *H. concinnum*. Leaves pale, crisped when dry, ovate-oblong, shortly acuminate, toothed at the apex, margin thickened; nerve stout, excurrent; dorsal cordate, acuminate; perichæial with longer points. Fruitstalk slender,  $\frac{1}{4}$  in. long, rough. Capsule horizontal, annulate; operculum beaked, as long as the capsule. Calyptra cleft on one side. Inflorescence monœcious.—Mitten in Journ. Linn. Soc. iv. 96. *Leskea concinna*, Schwægr. Suppl. t. 269 (not of Hooker).

**Northern** and **Middle** Islands: common in damp forests, etc. (Australia, Tasmania, Chili, Java.)

## 68. CYATHOPHORUM, Palisot.

Bright green, large, simple, diœcious mosses. Rhizome creeping on trees; stems erect, simple. Leaves 3-ranked; lateral vertical, spreading, oblique; dorsal smaller, stipule-like, rounded, appressed to the stem; nerve short, often 2-fid; cells large, lax. Fruitstalk lateral, very short, inserted in a cup-shaped tumid sheath on the under-surface of the stems. Capsule oblong, straight, annulate; peristome of *Hypnum*. Operculum convex; acuminate. Calyptra small, mitriform.

A most beautiful genus of mosses, confined to India, Australia, and N. Zealand.

1. **C. pennatum**, *Bridel*;—*Fl. N. Z.* ii. 120. Stems erect, 2 in. to 1 ft. long, simple, rarely 2-fid, naked below, very flat, bright green and translucent. Leaves distichous; lateral  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, ovate-oblong, oblique, serrate; nerve half as long, often forked; dorsal leaves rounded, apiculate; perichætil small, slender. Fruitstalk very short, stout, curved; sheath large, conspicuous. Capsules large, ovoid, pale brown; spores small; operculum conical, acuminate, half as long as the capsule. Calyptra very small, cellular, brown, covering the upper half of the operculum. Antheridia mixed with club-shaped paraphyses.—*Hookeria pennata*, Hook. Musc. Exot. t. 163.

Var. *β. minus*. Leaves more distant, acute, Fl. Antarct. i. 143. t. 62. f. 3.

Var. *γ. apiculatum*. Stems short; leaves shorter, apiculate, more sharply serrate.

Abundant throughout the islands from the Bay of Islands to Lord Auckland's Island. Var. *β.* Lord Auckland's Island, *J. D. H.*; Totara, *Colenso*. Var. *γ.* Middle Island, *Lyall*. (Tasmania and S.E. Australia.)

#### 69. CALOMNION, Hook. f. and Wils.

A minute, densely tufted, diœcious, bright green, shining moss, growing on trunks of trees. Stems simple, flattened, lanceolate, erect from a creeping rhizome. Leaves 3-farious, of 2 forms; lateral distichous, lanceolate; dorsal appressed, broader, both quite entire, with stout nerves; cells minute, rounded. Fruitstalk terminal, stout, erect. Capsule erect, cylindric-oblong, annulate; mouth contracted; teeth 0. Operculum with a long beak. Calyptra cucullate.

A very curious moss, of doubtful affinity.

1. **C. lætum**, *Hook. f. and Wils. Fl. N. Z.* ii. 97. t. 87. f. 5. Stems  $\frac{1}{4}$  in. high, persistent, the old ones bristle-like. Lateral leaves vertical, but not as to insertion, oblong-lanceolate, acute; nerve reaching the tip; dorsal leaves appressed, nearly orbicular, apiculate; perichætil erect, linear, rather obtuse. Fruitstalk about as long as the stem; operculum nearly as long as the capsule. Male flowers gemmiform, with closely imbricate scales; paraphyses few or 0.—*Eucladon complanatum*, Hook. f. and Wils. in Lond. Journ. Bot. iii. 538.

**Northern** and **Middle** Islands: Bay of Islands, *Sinclair*; on dead trees and tree-fern trunks, *J. D. H.*; Waikahi, *Sinclair*; Auckland, *Knight*; N.E. valley, Otago, *Hector and Buchanan*.

#### 70. RACOPILUM, Palisot.

Rigid dark green mosses. Stems creeping, on wood, rock, and the ground, more or less pinnately branched, often tomentose with radicles. Leaves more or less distichous, or imbricate all round, usually of two forms; lateral spreading, subdistichous, subpapillose; dorsal smaller; nerve excurrent, piliferous; cells minute, rounded. Fruitstalk lateral, stout or slender, erect, usually curved at the top. Capsule unequal, elongate, curved, drooping, erect, or pendulous, grooved, annulate; peristome of *Hypnum*. Operculum beaked. Calyptra mitriform, more or less hairy below, rarely glabrous, sometimes dimidiate, base inflexed, fringed.

A rather large tropical and subtropical genus.

a. *Leaves of two forms; dorsal smaller.*

- Leaves ovate-oblong, acuminate. Fruitstalk stout,  $\frac{1}{2}$  in. long . . . 1. *R. strumiferum*.  
 Leaves oblong, obtuse. Fruitstalk very slender . . . . . 2. *R. cristatum*.  
 Leaves ovate-oblong, acuminate. Fruitstalk stout,  $1-1\frac{1}{2}$  in. long . . . 3. *R. lætum*.

β. *Leaves uniform.*

- Leaves obliquely ovate-cordate, acuminate . . . . . 4. *R. robustum*.

1. **R. strumiferum**, C. Muell. Bot. Zeit. 1851, 563.—*R. australe*, Fl. N. Z. ii. 121. t. 92. f. 7. Stem  $\frac{1}{2}$ –6 in. long, tomentose with brown radicles, vaguely subpinnately branched; branches short, straight or curved. Leaves yellow or green, crisped when dry, lateral distichous, spreading, ovate or oblong-ovate, acuminate and almost piliferous by the long, stout, pellucid excurrent nerve, serrulate at the apex, dorsal leaves smaller. Fruitstalk  $\frac{1}{2}$  in. long, stout, 3-angular when dry. Capsule yellow, afterwards red, horizontal, decurved, strumose, narrow, cylindrical, grooved; operculum with a short beak. Calyptra hairy, inflated below, hardly dimidiate. Inflorescence monœcious or diœcious.

**Northern and Middle Islands**: common in forests, on the roots of trees, Cunningham, etc. (Tasmania.)

2. **R. cristatum**, Hook. f. and Wils. Fl. N. Z. ii. 121. t. 92. f. 7. Stem 1–3 in. long, slender, vaguely branched. Leaves pale green, much smaller than in the others, lateral distichous, spreading, crisped when dry, oblong, obtuse, serrulate at the apex; nerve excurrent in a hair-point; dorsal much smaller, ovate-cordate, acuminate. Fruitstalk  $\frac{3}{4}$  in. long, very slender, terete when dry. Capsule horizontal, curved, grooved; teeth scabrid at the back; operculum with a short beak. Calyptra sparingly pilose, dimidiate.—? *R. tomentosum*, C. Muell. in Bot. Zeit. 1851, 563.

**Northern Island**: forests at Tehawera, Colenso. **Kermadec group**, M'Gillivray. (Norfolk Island, Tasmania, Australia, India, Japan, Pacific.)

3. **R. lætum**, Mitten in Journ. Linn. Soc. iv. 93. Stem slender, 1–2 in. long. Leaves pale yellow-green, lax, crisped when dry, lateral, subdistichous, oblong-lanceolate, acuminate, subserrulate; nerve concolorous, excurrent; dorsal broader, shorter, ovate, acute. Fruitstalk  $1-1\frac{1}{2}$  in. long, twisted when dry. Capsule horizontal, slightly curved; operculum with a subulate beak,  $\frac{1}{2}$  as long as the capsule. Calyptra sparingly pilose.

**Northern Island**, Kerr; Auckland, Sinclair. **Middle Island**, Nelson, Jolliffe, Mantell. Very similar to *R. strumiferum*, but the fruitstalk is much longer.

4. **R. robustum**, Hook. f. and Wils. Fl. N. Z. ii. 121. t. 92. f. 5. Stems stout,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, sparingly branched; branches ascending. Leaves all uniform, pale yellow-green, crowded, spreading, complicate and involute when dry, obliquely ovate-cordate, acuminate, subserrate at the apex, piliferous apex long. Fruitstalk stout,  $\frac{1}{2}$  in. long, twisted when dry. Capsule much curved, long cylindric, lower part erect, upper horizontal, grooved; operculum shortly beaked. Calyptra mitriform, hairy, shortly split at the base. Inflorescence monœcious?

**Northern** Island: forests at Tehau-totara, etc., *Colenso, Jolliffe*. **Chatham** Island, *W. Travers*.

### 71. *HOOKERIA*, Smith.

Monœcious or diœcious mosses. Stems prostrate or creeping, rarely sub-erect, variously branched, often pinnately; branches usually compressed or quite flat. Leaves usually membranous, imbricate all round or distichous; lateral often dissimilar, stipule-like and oblique; nerve 0 or 1-2; cells lax, rhomboid or hexagonal. Fruitstalk lateral, slender, often recurved at the top. Capsule ovoid, cernuous; annulus obscure or 0; peristome double; outer of 16 lanceolate-subulate incurved teeth, ribbed on the outer face, trabeculate on the inner; inner a membrane divided into 16 keeled teeth, with rarely interposed cilia; operculum beaked. Calyptra mitriform, naked or fringed at the base.

A large genus of tropical and temperate mosses, of which few species occur in the north temperate zone, but many in the south.

§ I. *SAULOMA*, *Hook f. and Wils.* Leaves subsecund, not margined; cells large, lax. Outer teeth remotely barred at the back; inner keeled, without interposed cilia. Calyptra naked, inflexed at the base, not fimbriate.

Leaves oblong-ovate, acute, quite entire . . . . . 1. *H. tenella*.

§ II. *MNIADELPHUS*, *C. Muell.* Leaves margined or not; nerve 0 or vanishing. Inner teeth of peristome without interposed cilia. Calyptra fimbriate at the base (*Distichophyllum*, Dozy and Molkb.).

#### a. *Leaves with thickened margins.*

##### \* *Leaves serrulate; nerve 0 or reaching halfway.*

Leaves orbicular-obovate; cells large, lax; nerve 0 . . . . . 2. *H. apiculata*.

Leaves orbicular-ovate; cells large, lax; nerve reaching halfway . . . . . 3. *H. rotundifolia*.

##### \*\* *Leaves quite entire; nerve reaching halfway.*

Leaves green, obovate or oblong; cells small; perichaetial acuminate . . . . . 4. *H. crispula*.

Leaves white, obovate, apiculate; cells small; perichaetial obtuse . . . . . 5. *H. pulchella*.

Leaves yellowish, obovate, apiculate, crisped when dry; perichaetial obtuse . . . . . 6. *H. sinuosa*.

Leaves yellow-green, obovate, not apiculate; margin reflexed; perichaetial obtuse . . . . . 7. *H. amblyophylla*.

Leaves yellow, oblong, acute, filiny; perichaetial acute . . . . . 8. *H. adnata*.

Leaves obovate-spathulate, apiculate, opaque; perichaetial ovate, acute . . . . . 9. *H. flexuosa*.

#### β. *Leaves without thickened margins.*

Leaves obovate, obtuse . . . . . 10. *H. microcarpa*,

§ III. *PTERYGOPHYLLUM*, *Bridel.* Leaves flattened, not margined, toothed; nerve short, 2-fid; cells large, lax. Fruitstalk glabrous. Outer teeth remotely barred. Calyptra not fimbriate at the base, often lacinate. (The species of this section are probably all forms of one.)

Stems 2-10 in. long. Leaves pale green, obovate or rhomboid . . . . . 11. *H. quadrifaria*.

Stems  $\frac{1}{4}$ -1 in. long. Leaves blackish, oblong-ovate or obovate . . . . . 12. *H. denticulata*.

Stems 1-4 in. long. Leaves pale green, ovate-oblong . . . . . 13. *H. robusta*.

Stems  $\frac{1}{4}$ -1 in. long. Leaves brown or blackish and spathulate . . . . . 13. *H. nigella*.

§ IV. *ERIOPIUS*, *Bridel.* Leaves flattened, scarcely margined, serrate; nerves 2, short; cells large, lax. Fruitstalk crested above with long hairs. Outer teeth trabeculate; inner with interposed cilia. Calyptra fimbriate at the base; papillose at the apex.



Stems 2-4 in. long. Leaves obovate . . . . . 14. *H. cristata*.  
 Stems 1 in. high. Leaves orbicular-oblong . . . . . 15. *H. flexicollis*.

### § I. SAULOMA.

1. ***H. tenella***, *Hook. f. and Wils. Fl. N. Z.* ii. 122. *t.* 92. *f.* 8. Stems short, stout, sparingly branched,  $\frac{1}{3}$  in. high. Leaves almost white, glossy, crowded, imbricate, secund, plicate, narrow ovate-oblong or lanceolate, acute; margin quite entire, not thickened, recurved; nerve 0 or very faint; cells lax; perichætil small, ovate-lanceolate, erect. Fruitstalk  $\frac{1}{2}$  in. high, smooth. Capsule erect or subcernuous, small, ovoid, contracted below the mouth when dry; operculum short, conical, hardly beaked. Calyptra naked, even at the base. Inflorescence diœcious.

**Northern** and **Middle** Islands: on dead wood, *Colenso*; Banks's Peninsula, *Lyall*. (Tasmania.)

### § II. MNIADELPHUS.

2. ***H. apiculata***, *Hook. f. and Wils. Fl. Antart.* 421, 155. *f.* 6;—*Fl. N. Z.* ii. 122. Stems tufted, 1 in. high, stout, erect, sparingly branched, below covered with black radicles; branches compressed, fertile, procumbent. Leaves loosely imbricate, undulate when dry, lateral spreading; dorsal appressed, ovate-orbicular, apiculate; margin thickened, subserrate at the apex; nerve 0; cells large, hexagonal; perichætil erect, ovate-lanceolate, acute. Fruitstalk flexuous, rough. Capsule horizontal or cernuous, ovoid, subapophysate; operculum shorter than the capsule, with a straight beak. Calyptra small, hairy, white, fimbriate at the base. Inflorescence diœcious.

**Northern** Island: creeping amongst *Racomitrium* (barren), *Colenso*. Mitten observes that this is truly an *Eriopus*, though wanting the technical character of the hairs on the fruitstalk. (Tasmania, *Fuegia*.)

3. ***H. rotundifolia***, *Hook. f. and Wils. in Lond. Journ. Bot.* 1844, p. 551;—*Fl. N. Z.* ii. 122. *t.* 93. *f.* 1. Small; stems prostrate,  $\frac{1}{4}$ — $\frac{1}{2}$  in. long, sparingly branched; branches compressed, slender. Leaves dark green, lax, spreading, crisped when dry, orbicular-ovate, apiculate; margin thickened, toothed; nerve reaching halfway; cells large, lax; perichætil toothed. Fruitstalk slender,  $\frac{1}{4}$  in. long, smooth. Capsule horizontal, narrow-oblong, pale; operculum with a slender straight beak, nearly as long as the capsule. Calyptra fimbriate at the base. Inflorescence diœcious.

**Northern** and **Middle** Islands: not uncommon on fallen trees, etc., from the Bay of Islands, *J. D. H.*, to Milford Sound, *Lyall*.

4. ***H. crispula***, *Hook. f. and Wils. Fl. N. Z.* ii. 122. *t.* 93. *f.* 2. Stems short, green, rather broad, prostrate,  $\frac{1}{2}$  in. long, very sparingly branched; branches flattened. Leaves bright green, opaque, not glossy, spreading, distichous, crisped when dry, obovate-oblong or broadly oblong, apiculate; margin thickened, quite entire; nerve reaching halfway; cells very minute; perichætil ovate, acuminate. Fruitstalk slender, smooth. Capsule, etc., as in *H. rotundifolia*.

**Northern** Island: Bay of Islands, on clay banks, *J. D. H.* **Lord Auckland's** group, *Hombrou* (vide *Montagne*). (Tasmania.)

5. **H. pulchella**, *Hook. f. and Wils. Fl. Antart. 142. t. 62. f. 1*;—*Fl. N. Z.* ii. 123. Stems prostrate,  $\frac{1}{2}$  in. long, soft, flattened, sparingly branched. Leaves white, pellucid, flaccid, crowded, distichous, broadly obovate, obtuse or apiculate, with a narrow, thickened, quite entire margin; nerve reaching halfway; cells small, rounded; perichætil erect, smaller, ovate, obtuse; tips reflexed. Fruitstalk  $\frac{1}{2}$  in. high, rough and thickened at the top. Capsule suberect or cernuous, small, oblong, with a narrow apophysis; operculum shorter than the capsule; beak straight. Calyptra fimbriate. Inflorescence diœcious.

**Northern** Island: Taranua, *Colenso*. **Middle** Island: common, Bligh's Sound, *Lyall*; Canterbury, *Travers*; on the ground, Otago, *Hector and Buchanan*. **Lord Auckland's** group: on twigs of trees, *J. D. H.* (Tasmania.)

6. **H. sinuosa**, *Hook. f. and Wils. Fl. Tasm. ii. 219. t. 177. f. 3*. Stems  $\frac{1}{2}$  in. long, compressed, sparingly branched. Leaves yellowish, crowded, firm, subdistichous, crisped and undulate when dry, obovate, obtuse; margin broadly thickened, quite entire; nerve reaching halfway; cells small; perichætil small, obtuse. Fruitstalk 1 in. high, glossy, smooth, red. Capsule imperfect. Calyptra fimbriate. Inflorescence diœcious.

**Northern** Island: probably from near Auckland, *Sinclair*. (Tasmania.)

7. **H. amblyophylla**, *Hook. f. and Wils. Fl. N. Z. ii. 123. t. 93. f. 3*. Stems large, stout, prostrate, 2–3 in. long, sparingly branched, compressed. Leaves yellow-green, lurid when old, crowded, distichous, erecto-patent, appressed when dry, obovate, rounded at the apex; margin thickened, quite entire, and often recurved at the apex; nerve reaching halfway; cells minute; perichætil obtuse. Fruitstalk 1 in. high, slender, smooth. Capsule small, narrow, horizontal or cernuous. Calyptra fimbriate at the base. Inflorescence diœcious.

**Northern** Island; Port Nicholson, *Sinclair*; Auckland, *Knight*. **Middle** Island: bogs, Matura river, *Hector and Buchanan*. (Tasmania.)

8. **H. adnata**, *Hook. f. and Wils. Fl. N. Z. ii. 123. t. 93. f. 4*. Stems short,  $\frac{1}{4}$  in. long, reddish, sparingly branched; branches broad, compressed. Leaves pale yellow, delicately membranous, distichous, undulate when dry, oblong or subspathulate, acute; margin very narrowly thickened, quite entire; nerve reaching halfway; cells minute; perichætil ovate, acute. Fruitstalk very slender,  $\frac{1}{3}$  in. long, smooth, red. Capsule very small, cernuous, ovoid; operculum as long as the capsule; beak slender. Calyptra fimbriate at the base. Inflorescence wunœcious.

**Northern** Island: common on leaves of trees and ferns, especially on *Trichomanes elongatum*, *Cunningham*, etc.

9. **H. flexuosa**, *Mitten*. A small species, intermediate between *H. adnata* and *crispula*. Leaves spreading, obovate-spathulate obovate-oblong or broadly oblong, shortly apiculate; margin thin, flexuous, cartilaginous; nerve vanishing beyond the middle; cells very minute, rounded; perichætil small, ovate, acute. Fruitstalk curved and subscabrid at the apex. Capsule ovoid, horizontal; operculum subulate.—*Mitten*, mss.

**Middle** Island: Banks's Peninsula, *Herb. Knight*.—I have seen no specimens of this

species, which Mitten describes from two stems sent by Dr. Knight; he observes that the very minute cells ( $\frac{1}{3000}$  in. diam.) give a more obscure appearance to this moss than to any of its allies.

10. **H. microcarpa**, *Hook. f. and Wils. Fl. N. Z.* ii. 123. Stems 1–5 in. long, vaguely branched; branches broad, compressed. Leaves large, pale green, whitish in the middle, distichous, imbricate, appressed when dry, obovate, obtuse; margin not thickened, quite entire; nerve 0; cells large and pellucid near the centre, smaller towards the margin; perichætil minute, ovate-lanceolate. Fruitstalk  $\frac{1}{2}$  in. long. Capsule small, erect or cernuous, ovoid; operculum short, beaked. Calyptra fimbriate at the base. Inflorescence diœcious.—*Hypnum*, Hedwig, *Sp. Musc.* t. 59. *Pterigophyllum*, Bridel.

Abundant throughout the **Northern** and **Middle** Islands, *Cunningham*, etc. (Tasmania.)

### § III. PTERIGOPHYLLUM.

11. **H. quadrifaria**, *Smith*;—*Fl. N. Z.* ii. 124. Very large. Stems suberect, 2–10 in. long, sparingly branched; branches compressed,  $\frac{1}{2}$  in. broad. Leaves pale green, large, whitish when old, loosely imbricate, distichous, vertical, obliquely broadly obovate or subrhomboid, obtuse; margin not thickened, denticulate (quite entire on barren shoots); dorsal suborbicular; nerve forked, vanishing; cells large, lax, hexagonal; perichætil small, ovate. Fruitstalk 1 in. long. Capsule pendulous, oblong, tubercled; operculum conical, with a nearly straight subulate beak. Calyptra small; base not fimbriate, lacerate. Inflorescence diœcious.—*Hook. Musc. Exot.* t. 109; *Schwægr. Suppl.* t. 162.

Throughout the **Northern** and **Middle** Islands: abundant, *Menzies*, etc.; in dark woods, on the ground.

12. **H. denticulata**, *Hook. f. and Wils. Fl. Antarct.* i. t. 62. f. 2. Stem suberect, sparingly branched, 1 in. high; branches compressed, subincurved, rigid when dry. Leaves shining, pale green when fresh, opaque black crisped and fragile when dry, loosely sub-4-fariously imbricate, lateral distichous, oblong, ovate or obovate, obtuse or subacute; margin toothed, not thickened; dorsal orbicular; nerve short, vanishing, 2-fid; cells large, hexagonal; perichætil small, ovate. Fruitstalk  $\frac{1}{2}$  in. long, stout, red. Capsule cernuous or pendulous, oblong, narrowed at the base; operculum short, beaked. Calyptra glabrous, coriaceous, not fimbriate at the base. Inflorescence diœcious.

**Lord Auckland's** group and **Campbell's** Island: in wet places, *J. D. H.* (Fuegia and Falkland Islands.)

13. **H. robusta**, *Hook. f. and Wils. Fl. N. Z.* ii. 124. t. 93. f. 5. Very large; stems 1–4 in. high, suberect, rigid, sparingly branched; branches flattened. Leaves pale yellow-green, subglaucous, slightly undulate when dry, distichous, vertical, coriaceous, ovate-oblong, obtuse; margin not thickened, toothed; nerve purplish, reaching to the middle; dorsal erect, appressed, obovate. Fruitstalk  $\frac{3}{4}$  in. long, smooth. Capsule pendulous, ovoid; operculum very short. Calyptra glabrous. Inflorescence diœcious.

**Northern** Island: moist woods, in the interior, *Colenso*, etc.

14. **H. nigella**, *Hook. f. and Wils. Fl. N. Z.* ii. 124. t. 93. f. 6. Stems suberect,  $\frac{1}{4}$ –1 in. high; branches and foliage as in *H. denticulata*, but lurid-green, spathulate-obovate, blackish when dry; perichætal forming a conspicuous bulb, and operculum shorter than the capsule.

Throughout the **Northern** and **Middle** Islands: in dark woods. **Kermadec** group, *Milne*. **Lord Auckland's** Island, U. S. Expl. Exped. (Tasmania, Australia.)

#### § IV. ERIOPUS.

15. **H. cristata**, *Arnott*;—*Fl. N. Z.* ii. 125. Large, robust. Stems rigid, suberect, 2–4 in. high, sparingly branched; branches flattened,  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad. Leaves green, pale, crisped when dry, laxly imbricate, distichous, broadly obovate, subacute; margin slightly thickened, sharply serrate; dorsal orbicular, apiculate; nerves 2, basal; perichætal broadly ovate, acuminate, piliferous. Fruitstalk short,  $\frac{1}{3}$ – $\frac{3}{4}$  in., arched at the top, then crested with long white hairs. Capsule subpendulous, pyriform; operculum beaked. Calyptra short, ciliate, fimbriate at the base, papillose at the top. Inflorescence diœcious.—*Leskea*, Hedwig, *Sp. Musc.* t. 49. *Chatophora*, Bridel.

Common in damp places throughout the **Northern** and **Middle** Islands: on trunks of trees, etc.

16. **H. flexicollis**, *Mitten, mss.* Stems  $\frac{1}{2}$ –1 in. high, loosely tufted, ascending. Leaves pale yellow-green, lateral spreading, orbicular-oblong, apiculate; margin cartilaginous, serrulate above; nerve very short; cells small, oblong; dorsal smaller; perichætal ovate-subulate. Fruitstalk pale, crested with cilia, flexuous. Capsule small, short, oval, horizontal; operculum subulate. Calyptra pale, with appressed cilia.

**Middle** Island: Canterbury Alps, *Sinclair and Haast*; Otago, wet rocks, *Dunedin, Hector and Buchanan*. Closely allied to *H. apiculata*, but the fruitstalk is crested with bristles.

#### 72. DALTONIA, Hook. and Tayl.

Small, erect, tufted, monœcious or hermaphrodite mosses. Leaves imbricated all round the stem; margin thickened; nerve strong; cells rhomboid. Fruitstalk lateral, erect, rather rough. Capsule erect or suberect, ovoid, obscurely apophysate; annulus 0; peristome double, outer of 16 narrow teeth, incurved when dry, recurved when moist, with a middle line, slightly barred; inner a membrane divided to the base into 16 keeled cilia. Operculum with a straight beak. Calyptra conico-mitriform, ciliate at the base.

A small genus of tropical and temperate mosses, often growing on small twigs of trees and bushes.

1. **D. nervosa**, *Hook. f. and Wils. in Wils. Bryol. Brit.* 419 in note.—*Hookeria*, *Fl. Antarct.* 142. t. 61. f. 5. Stems crowded, suberect,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. high, sparingly fastigiately branched. Leaves pale green, closely imbricate, erecto-patent, appressed when dry, ovate-lanceolate, acuminate, keeled; margin thickened, quite entire; nerve strong, continuous, subexcurrent; cells rounded; perichætal shorter, erect, oblong, subacute. Fruitstalk  $\frac{1}{4}$  in. long, red, rough near the top. Capsule small, suberect, cylindric-ovoid, apophysate; operculum conical, with a short beak. Calyptra fimbriate at the base.—*D. Novæ-Zelandiæ*, *Mitten* in *Journ. Linn. Soc.* iv. 95.



**Northern Island** : Wellington, *Stephenson*. **Lord Auckland's** group : on twigs of bushes, etc., *J. D. H.* Much resembling the British *D. splachnoides*, in which the nerve ceases below the apex of the leaf.

## ORDER V. HEPATICÆ.

(Including JUNGERMANNIÆ and MARCHANTIÆ.)

Small plants, rarely more than 1-2 in. high, loosely cellular, without woody fibres or vascular tissue. Fronds either furnished with stem and leaves, or forming flat, more or less divided foliaceous expansions. Leaves usually distichous, sometimes tristichous, those on one surface being smaller (stipules). Reproductive organs of three kinds : *capsules* containing minute spores, produced (as in *Musci*) from archegonia ; *antheridia*, which are minute membranous sacs, by means of whose contents the archegonia are fertilized, and *gemmae*. 1. CAPSULE lateral or terminal, either sunk in the frond or more often raised on a white cellular stalk ; sometimes hidden in cavities of a stalked green receptacle, usually bursting into 4 valves placed crosswise, and containing microscopic spores mixed with spiral fibres. At an early stage the capsule is covered with a *calyptra*, which is tipped with a brown styliform process and sheathed at the base by a tubular or flattened *perianth*, which again is usually surrounded by altered leaves which form the *involucre*. 2. ANTHERIDIA oblong or globose, membranous sacs, as in *Musci*. 3. GEMMÆ or cellular buds, found chiefly in the frondose division (MARCHANTIÆ), in variously-shaped receptacles on the surface of the frond.

A large Order of plants, found in all parts of the world, but most abundant in the humid, warm, and temperate climates.

The *Hepaticæ* may be divided into two primary groups, one of them *foliaceous*, which are supplied with distinct leaves, and the other *frondose*, in which the green axis is continuous and simple, or forked or lobed at the edge ; two New Zealand genera, *Noteroclada* and *Fossombronia*, are intermediate between these groups, and may be regarded either as frondose, with the frond pinnatifid to the midrib, or as foliaceous, with the leaves united more or less at the base.

To understand the structure of a foliaceous *Hepatica*, search any copse or forest for green or brown moss-like plants, bearing slender white cellular fruitstalks surmounted by 4 little brown radiating arms (valves) placed cross-wise. These differ conspicuously from all mosses in the white cellular fruitstalk, and capsule divided into the above 4 radiating valves ; they further differ from most mosses in the leaves being invariably 2-ranked or sometimes 3-ranked, the third rank being different in form and called stipules ; also, unlike so many mosses, they rarely grow upright, and the rootlets all descend from one side only of the stem and branches. Now let the specimen be held up with the side from which the roots descend away from the observer ; this surface is called the *ventral*, that towards the observer the *dorsal*. The third rank of leaves (stipules), if present, is invariably dorsal, and the rootlets often grow from the base of the stipules. Next observe the direction in which the leaves are set in the stem ; they are rarely horizontally set on, usually obliquely. If the obliquity is such that the lower margin is next the observer (dorsal), the insertion of the leaves is called *succubous*, in this case (still looking at the dorsal side of the stem) each leaf overlaps the one below it, or would do so if they were close together. If, on the other hand, the upper margin is next the observer (dorsal), the insertion is called *incubous*, and in this case each leaf overlaps the one above it. This must be clearly understood, for no genus has both incubous and succubous leaves. In some genera one margin of the leaf, always the ventral, unites with the stipule ; if the genus is succubous, the union is between the leaf and the stipule above it (*Lepidozia*) ; if incubous, between the leaf and the stipule below it (*Mastigobryum*).

The fruiting organs appear at the tips or sides of the stems or branches, or sometimes of short lateral proper branchlets (*i. e.* of branchlets formed for the purpose) and consist of, first, an *involucre* formed of the two (or few) last pairs of leaves and the corresponding stipules, which become erect, often elongate, and are more lobed than usual; within this is second, the *perianth*, an erect tubular or inflated sheath, often compressed, winged or angled, with a contracted or dilated entire lobed or 2-3-lipped mouth; within this again is, third, the calyptra, an oblong cylindric body, split at the side or top; and fourth, inserted within the calyptra, is the capsule, which, when ripe, is carried up on a long or short white cellular fruit-stalk.

The capsule splits into 4 valves placed crosswise, and contains spores mixed with extremely delicate long cells, which contain usually 2 coiled fibres.

Of all these organs the calyptra alone is never absent: there may be no involucre, or the involucral leaves may be adnate to the perianth, or reduced to scales growing on the perianth. The calyptra is sometimes confluent with the perianth; in *Gottschea* it is sunk in the hollowed tip of the stem; in *Saccogyne* and *Gymnogyne*, it is enclosed in a curious fleshy tubular sac that descends from the branch into the ground, or swings from the tip of the branch.

So much for the plant when in fruit. The *female inflorescence* consists of one or more *archegonia*, analogous to those of mosses; these are slender flagon-shaped bodies, with a central cavity communicating with the air by the tubular neck. In the cavity of the archegonium is a solitary loose cell; to this the antherozoid (from the antheridia or male inflorescence) gains access and fertilizes it. After fertilization the archegonium swells (often carrying up on its surface the other archegonia, which, not being fertilized, do not change) and its aperture closes; meanwhile the enclosed cell is becoming rapidly developed into a capsule, with its fruitstalk, which eventually bursts through the side of the enlarged archegonium (thereafter called calyptra), rises into the air, splits into 4 valves, and discharges the spores. Thus, one great difference between *Musci* and *Hepaticæ* is, that in the former the archegonium after being developed into a calyptra, is ruptured at its base and carried up on the top of the capsule, whilst in *Hepaticæ* it remains attached to the stem and the capsule bursts through it.

The *male inflorescence* consists of minute pedicelled sacs (*antheridia*), usually solitary in the axils of modified leaves (*perigonia*), which sometimes occupy proper branchlets. The antheridia are on the same or different plants from the archegonia, and contain cells with an enclosed spiral filament (antherozoids), which are supposed to gain access to and fertilize the pistillidia.

Of the frondose *Hepaticæ* many have the same kind of fruit as has been described; but in *Marchantieæ* the involucre perianth and capsule, instead of rising erect from the frond, are placed on the under side, and are consequently pendulous from a stalked peltate hemispherical receptacle, and the antheridia are in cups or are imbedded in the substance of the frond; in these plants, too, are often found reproductive, green, structureless, globose or oblong bodies, called *gemmæ*, which grow in special cups. In *Anthoceros* the capsule is erect, as in the foliaceous species, but is very long, linear, and splits down one side. Finally, in *Riccia*, the spherical calyptra is sunk in the substance of the frond, and does not emerge from its substance. It firmly coheres with the enclosed capsule, and both burst as one body, discharging the contained spores.

Of the *Hepaticæ* (about 212) here enumerated, the greater majority were discovered by Mr. Colenso and myself, and were new to science on the return of the Antarctic Expedition to England. They were placed, at the late Dr. Taylor's request, in his hands for immediate publication, and the descriptions of many appeared, in 1844, in Hooker's 'London Journal of Botany,' and again in the 'Botany of the Antarctic Voyage.' At that time the valuable 'Synopsis Hepaticarum' of Gottsche, Lindenbergh, and Nees ab Esenbeck, was not published (it was not completed till 1847), and the difficulty of ascertaining and defining the genera and species was very great indeed. Owing to this cause and to Dr. Taylor's precipitancy in publication, much confusion crept into his work; the same plant appearing under several generic names, and some descriptions answering to subsequently cancelled species, having been also published as good species. It is still more unfortunate that Dr. Taylor did not return to the Hookerian herbarian specimens of all the species which he received for publication, and his herbarium having been sold since his death, there is now little chance of some

of his New Zealand species ever being recognized. Whilst feeling it my duty to make these facts clearly known, I must add, that those who study this extensive Order of plants by the aid of modern works, can have no conception of the difficulties which Dr. Taylor had to overcome, twenty-two years ago, in classifying and naming the 300 or 400 *Hepaticæ* with which I supplied him, and of which not fifty had been published; imperfect and hasty as his work was, it showed great skill, no little sagacity, and indomitable perseverance as a microscopic investigator.

In the present work I have followed in Mr. Mitten's footsteps, he having drawn up all the descriptions for the '*Flora Novæ-Zelandiæ*,' with great care; and to him, too, I am indebted for naming the species of this Order received since the publication of that work; he has also detected many of Dr. Taylor's errors, and rediscovered, in later collections, many of his lost species.

It only remains to append the same caution to the student of this as of every other Order of Cryptogams, viz. that his advance must be slow to be sure, and that it will take some months' careful collecting and study with the microscope to arrive at any clear general idea of the genera of this difficult Order. The most useful books are Gottsche, Lindenbergh, and Nees's '*Synopsis Hepaticarum*,' Hamburg, 1844 (but not completed till 1847), an 8vo volume of 834 pages, without plates, this I have quoted under the abbreviated title *Syn. Hep.*; and for plates, the '*Flora Novæ-Zelandiæ*,' '*Flora Antarctica*,' and Hooker's '*Musci Exotici*,' 8vo, all contain figures of many species.

The following sketch of the genera and species is, no doubt, very incomplete, and probably also far from satisfactory in various points; but there really are not materials for a satisfactory and sufficient examination of a great many of the species, and long descriptions of imperfect or small specimens are sure to mislead. It can be regarded as a mere outline only, representing the condition of our knowledge at the present time. I have found it impossible to construct satisfactory keys to the species, but the descriptions are so short that these will scarcely be missed.

#### KEY TO THE GENERA OF THE NEW ZEALAND HEPATICÆ.

I. FOLIOSE.—*Plants with distinct leaves and often stipules. Capsule solitary, on an erect fruitstalk, 4-valved. Elaters with 2 spiral fibres.*

A. *Leaves succubous.*

\* *Perianth 0.*

1. GYMNOTRITIUM. Leaves entire or 2-fid. Stipules minute or 0.

\*\* *Perianth of the same substance as the leaves, not produced downwards into a fleshy pendent tube.*

† *Perianth terminal (lateral in some Plagiochilæ).*

2. JUNGERMANNIA. Perianth tubular; mouth toothed. Stipules 0 or present.

3. PLAGIOCHILA. Perianth compressed at right angles to insertion of the leaves, obconic, 2-lipped. Stipules 0.

4. LEIOSCYPHUS. Perianth obconic, compressed, 2-lipped. Stipules 2–4-fid.

5. LOPHOCOLEA. Perianth 3-gonous, 3-lobed; lobes toothed. Stipules 2–4-cleft.

6. SCAPANIA. Perianth compressed parallel to the insertion of the leaves. Leaves 2-lobed. Stipules 0.

7. GOTTSCHÆA. Perianth sunk in the tumid top of the stem. Leaves large, complicate, fimbriate or crisped.

†† *Perianth lateral, or on extremely short lateral branches.*

8. CHILOSCYPHUS. Perianth obovate or campanulate, 2–3-lobed. Stipules present.

9. PSILOCLADA. Perianth tubular with falcate laeinæ. Leaves and stipules 4-cleft.

10. ADELANTHUS. Perianth tubular; mouth conniveat, toothed. Stipules 0.

\*\*\* *Perianth or involucre a pendulous fleshy tube.*

11. GYMANTHE. Perianth terminal.

12. SACCOGYNA. Perianth lateral.

B. *Leaves incubous.*\* *Perianth free. Leaves without an inflexed basal lobule.*† *Perianth lateral, or on very short lateral branchlets.*

13. LEPIDOZIA. Leaves and stipules very minute, 4-cleft. Perianth 3-plicate; mouth toothed.

14. MASTIGOBRYUM. Leaves entire or 3-dentate. Perianth 3-gonous.

15. MICROPTERYGIUM. Leaves concave, 2-fid. Perianth long, membranous.

†† *Fruit terminal.*

16. ISOTACHYS. Leaves and stipules nearly equal. Perianth tubular; mouth contracted, toothed.

\*\* *Perianth 0 or clothed with the adnate involucreal leaves.*† *Leaves without an inflexed basal lobule.*

17. TRICHOCOLEA. Leaves and stipules multifid; segments hair-like. Perianth 0.

18. SENDTNERA. Leaves and stipules deeply cleft. Perianth with a many-cleft mouth.

†† *Leaves with an inflexed basal lobule.*

19. POLYOTUS. Leaves closely imbricate. Stipules often 4-fid. Perianth 0.

\*\*\* *Perianth free, lateral or axillary on the upper branches. Leaves with an inflexed or adnate basal lobule.*† *Lobule membranous, incurved or appressed.*

20. RADULA. Perianth terete or flat. Stipules 0.

21. MADOTHECA. Perianth compressed; mouth contracted, 2-lipped. Stipules large.

22. LEJEUNIA. Perianth various; mouth contracted. Stipules entire or toothed, rarely 0. Leaves usually pale green.

†† *Lobule clavate, lunate, cylindric or half orbicular.*

23. FRULLANIA. Perianth keeled. Leaves and stipules purple or black, rarely green.

II. FRONDOSE.—*Plants with indistinct leaves, or consisting of a continuous scale- or leaf-like, simple or divided frond. (The 2 first genera are almost foliose.)*A. *Capsule solitary, globose or oblong, usually splitting into 4 valves (as in I. Foliose). Elaters with 2 or 3 spiral fibres.*\* *Perianth perfect.*† *Frond pinnate or pinnatifid. Perianth with adnate involucreal scales.*

24. FOSSOMBRONIA. Perianth dorsal. Lobes of frond angular.

25. NOTEROCLADA. Perianth subterminal. Lobes of frond orbicular.

†† *Frond continuous, simple, forked or divided.*

26. PETALOPHYLLUM. Frond crisped. Perianth rising from the midrib underneath, confluent with the perianth.

27. ZOOPSIS. Frond minute, slender, of bladderlike cells, the marginal with cilia. Perianth lateral, large, pedicelled, lacinate.

28. PDOMITRION. Frond erect, stalked, oblong. Perianth dorsal from the midrib, tubular.

29. STEETZIA. Fronds linear, forked. Perianth subterminal from the midrib, tubular; mouth toothed.

\*\* *Perianth 0.*

30. SYMPHYOGYNA. Frond linear, midrib indistinct. Involucre a toothed scale, dorsal.

31. METZGERIA. Frond linear; midrib distinct. Involucre a ventricose 2-lipped scale on the midrib beneath.

32. ANEURA. Frond linear, opaque, with no apparent midrib. Involucre cup-shaped, torn, marginal.



B. (MARCHANTIÆ).—*Capsules several, pendent from a stalked peltate cup-like receptacle.*

33. PLAGIOCHASMA. Receptacle minute, 3–4-lobed; lobes concealed by the ascending involucre.

34. MARCHANTIA. Receptacle large, 8–10-rayed; involucre 2-valved, with several capsules.

35. DUMORTIERA. Receptacle convex, hairy; involucre horizontal, opening by a lateral slit, with one capsule.

36. REBOULIA. Receptacle 1–6-lobed to the middle; involucre continuous with the margin of the lobe, with one capsule.

37. FIMBRIARIA. Receptacle conical, tubercled; margins forming 4 campanulate involucre, with one capsule.

C. (TARGIONIÆ).—*Capsule solitary towards the tip of the frond, erect, shortly stalked, bursting irregularly, enclosed in a sessile 2-valved involucre.*

38. TARGIONIA. Involucre of 2 longitudinal valves.

D. (ANTHOCEROTÆ).—*Capsule solitary on a long fruitstalk, erect, linear, very long, 2-valved, with a central filiform columella, bursting by 1 or 2 linear valves.*

39. ANTHOCEROS. Involucre tubular. Capsule with 2 linear valves; elaters 0.

E. (RICCIÆ).—*Capsules imbedded in the substance of the frond, valveless.*

40. RICCIA. Involucre 0. Calyptra cohering with the capsule.

# 1. GYMNOTRIDIUM, Corda.

Stems erect or creeping, usually very slender or capillary. Leaves succubous, distichous, flat or concave, entire or 2-lobed. Stipules 0 or very inconspicuous. Fruit terminal. Involucral leaves 2–4, convolute, emarginate-perianth 0. Calyptra short. Capsule globose on a slender fruitstalk; elaters with 2 spiral fibres. Antheridia axillary, obovate.

The genus has not been found in Tasmania; it passes into *ungermannia*.

1. **G. stygium**, Hook. f. and Tayl. ;—*Fl. Antart. 144. t. 62. f. 4.* Minute; stems erect, capillary,  $\frac{1}{4}$ – $\frac{1}{2}$  in. high, vaguely branched, olive-brown or purplish. Leaves erect, subsecund, loosely imbricate, broadly obovate, rounded or retuse at the apex; perichætal orbicular, hyaline at the margins.

**Campbell's Island**: creeping amongst mosses, etc., on rocks on the hills, *J. D. H.*—The southern representative of the northern *G. concinnatum*, which has 2-fid leaves.

2. **G. acinacifolium**, Hook. f. and Tayl. *Fl. Antart. 144. t. 62. f. 5.* Stems dark purple, erect, tufted, sparingly branched, 1 in. high. Leaves secund, closely imbricate, opaque, obliquely oblong or acinaciform, rounded at the apex, posterior margin recurved, anterior convex.

**Campbell's Island**: creeping amongst mosses and on rocks on the hills, *J. D. H.*

3. **G. ochrophyllum**, Hook. f. and Tayl. *Fl. Antart. 145. t. 62. f. 6.* Stems pale green, filiform, sparingly branched, 1–1½ in. high. Leaves distichous, loosely imbricate, erecto-patent, concave, obovate or subquadrate, shortly 2-fid; segments obtuse, cells lax. Stipules very minute or absent.—*G. minuta*, Fl. Antart. 152, not of Crantz.

**Lord Auckland's group**: amongst mosses on the hilltops, *J. D. H.*

4. **G. concinnatum**, Corda.—*Jungermannia*, Fl. N. Z. ii. 128. Stem erect, short; branches straight, thickened, obtuse and compressed at the apex.

Leaves most densely imbricate, ovate, 2-fid, with a narrow membranous border. Stipules 0.—Hook. Brit. Jung. t. 3.

**Northern Islands:** top of the Ruahine Mountains, *Colenso*. (Europe, Fuegia.)

## 2. JUNGERMANNIA, Linn.

Stems prostrate, creeping. Leaves succubous, distichous, entire or lobed. Stipules usually present. Fruit terminal on the main stem or on a lateral branch. Involucral leaves free. Perianth tubular, angular; mouth toothed or laciniate. Calyptra usually included. Capsule ovoid or globose, on a slender fruitstalk; elaters with 2 spiral fibres. Antheridia in the bases of inflated perigonal leaves.

One of the largest genera of *Hepaticæ*, found all over the globe.

§ 1. *Stipules* 0. *Leaves* entire or obscurely 1-toothed.

1. **J. monodon**, Hook. f. and Tayl.;—*Fl. N. Z.* ii. 128. t. 94. f. 2. Stems 1–2 in., purple or brown, flexuous. Leaves closely imbricate, ovate-lanceolate, acuminate, oblique, sometimes a tooth on one side; involucral 2-multifid, toothed. Perianth oblong, 4-plicate, mouth ciliated.—Syn. Hep. p. 664.

**Northern and Middle Islands:** common, *J. D. H.* (Tasmania.)

2. **J. inundata**, Hook. f. and Tayl.;—*Fl. N. Z.* ii. 129. t. 94. f. 3. Stems  $\frac{1}{4}$ – $\frac{1}{2}$  in., dirty green, procumbent. Leaves imbricate, almost vertical, orbicular, quite entire, dorsal margin decurrent, opaque; involucral larger, spreading. Stipules 0. Perianth turbinate, 4–5-plicate and laciniate. Capsule globose.—Syn. Hepat. 669.

**Northern Island:** inundated places, *J. D. H.*; Cape Kidnapper, *Colenso*.

3. **J. colorata**, Lehmann;—*Fl. N. Z.* ii. 128. Stems 1–2 in. high, purple or dusky green, sending off long thread-like flagella covered with scales. Leaves closely imbricate, nearly vertical, orbicular, quite entire; involucral incised. Stipules 0. Perianth ovoid, 8–10-plicate; mouth contracted, toothed.—Syn. Hep. 36 and 673.

**Northern Island:** top of the Ruahine range in bogs, *Colenso*, and probably on all the Alps. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (Australia, Tasmania, S. Africa, Juan Fernandez, Chili, Fuegia, etc.)

4. **J. flexicaulis**, Nees;—*Fl. N. Z.* ii. 128. Closely resembling *J. colorata*, but the leaves are subcordate, the involucral quite entire.—Syn. Hep. 87.

**Northern and Middle Islands:** Tararua Mountains, *Colenso*; Canterbury, *Travers*. (Java, Sandwich Islands.)

13. **J. perigonalis**, Hook. f. and Tayl.;—*Fl. Antarct.* 145. t. 62. f. 7. Minute; stems slender,  $\frac{1}{2}$  in. high. Leaves dark brown or purplish, distant, suberect, secund, concave, semiamplexicaul, ovate-orbicular or obovate, retuse or unequally 2-fid at the apex, quite entire; involucral acutely 2-dentate. Perianth tubular, elongate; mouth plicate, contracted, toothed.—*Fl. Tasm.* ii. 222. f. 178. f. 1.

**Lord Auckland's** group: rocks on the hilltops, *J. D. H.* (Tasmania.)

§ 2. *Stipules* 0. *Cauline leaves lobed or cut.*

5. **J. punicea**, *Nees*. Stems short, curved; branches rigid, narrowed at the tips, giving off stout flagella. Leaves subvertical, imbricate, nearly orbicular, 2-fid, teeth conniving, acute; involucre spreading, toothed, connate. Stipules 0. Perianth 3-gonous, plaited; mouth toothed.—Syn. Hep. 97 and 676; Mont. Voy. au Pôle Sud, i. 261. t. 17. f. 3.

**Lord Auckland's** group, *Hombron*.

6. **J. schismoides**, *Mont.*;—*Fl. N. Z.* ii. 129. Stems purple, 1–2 in. high, erect, rather stout, apices curved. Leaves closely imbricate, very concave or complicate, obliquely 2-lobed; lobes conniving, unequal, acute, cuspidate, entire or serrulate. Stipules 0.—Mont. Voy. au Pôle Sud, 258. t. 17. f. 1; *Fl. Antarct.* t. 161. f. 9.

**Southern** Island, *Lyall*. **Lord Auckland's** group and **Campbell's** Island: common, *Hombron*, *J. D. H.* (*Fuegia*).—The leaves are entire in N. Zealand specimens, serrulate in *Fuegian*.

6. **J. multicuspidata**, *Hook. f. and Tayl.*;—*Fl. Antarct.* 150. Stems loosely tufted, prostrate, sparingly branched. Leaves distant, whitish, suberect, membranous, pellucid, obovate, 2–4-fid to the middle, sinus obtuse, segments acute. Perianth lateral or terminal, long, cylindric, split at the side, mouth 3–4-toothed.—Syn. Hep. 686.

**Campbell's** Island: in pools near the sea, *J. D. H.*—Taylor compares this with *J. bicuspidata*.

§ 3. *Stipules present (sometimes absent in J. rotata). Leaves quite entire.*

8. **J. rotata**, *Hook. f. and Tayl.*;—*Fl. N. Z.* ii. 129. t. 24. f. 4. Stems procumbent, tufted, branched, recurved, flexuous, 1–3 in. high. Leaves imbricate, dark green, secund, erecto-patent, almost vertical, orbicular, concave, quite entire, ventral margin subdecurrent; involucre similar. Stipules appressed, lanceolate, or 0. Perianth obovate, above obtusely 4-gonous, with 4 inflexed laminae.—Syn. Hep. 672.

**Northern** Island: watery place near Taupo, *Colenso*. **Lord Auckland's** group: mixed with *Plag. fuscella*, *J. D. H.*

§ 4. *Stipules present. Leaves more or less toothed.*

9. **J. dentata**, *Raddi*;—*Fl. N. Z.* ii. 128. Stems creeping, with erect branches, swelling at the tips. Leaves rather remote, broader than the stem, subvertical, complicate-concave, orbicular-ovate, 2-fid to the middle, toothed; involucre numerous, imbricate, deeply 2-fid. Stipules subulate. Perianth narrow, membranous, 4-plicate, mouth denticulate.—Syn. Hep. 143.

**Northern** Island: Bay of Islands, *J. D. H.*; Te Aute, *Colenso*. (*Europe, Tasmania.*)

10. **J. squarrosa**, *Hook. Musc. Exot.* t. 78;—*Fl. N. Z.* ii. 127. Stem elongate, simple or dichotomous. Leaves patent, squarrose, most densely imbricate, quadrate, undulate, 2-cuspidate; lobes quite entire or 1-toothed, deflexed. Stipules large, similar, but the lobes have flexuous incurved teeth. Perianth ovate, plicate, mouth lacerate-ciliate.—Syn. Hep. 130.

**Northern** Island: Auckland, *D'Urville*, *Sinclair*; Ruahine Mountains, *Colenso*. **Middle** Island: Dusky Bay, *Menzies*; Nelson, *Mantell*.—The undulations of the leaves are omitted in the 'Musci Exotici' plate.

11. **J. pulchella**, *Hook. Musc. Exot. t. 94*;—*Fl. N. Z. ii. 128*. Stems tall, erect, nearly simple. Leaves half-vertical, subquadrate, 4-fid, very membranous. Stipules broad, 5-6-fid; divisions obtuse, ciliated. Perianth tubular, 3-gonous above; mouth truncate, fringed with long cilia that point in all directions.

**Northern** and **Middle** Islands: Auckland, *Sinclair*; Dusky Bay, *Menzies*; Port Nicholson and Port Preservation, *Lyall*. (Tasmania.)

12. **J. quadrifida**, *Mitten in Fl. N. Z. ii. 128. t. 94. f. 1*. Stems  $\frac{1}{2}$  in. long, ereeping, ascending, stoloniferous below, dirty brown, tips pink or yellowish. Leaves vertical, spreading, 4-fid to the middle, sinus obtuse, segments lanceolate, entire or toothed. Stipules similar, and involucre sharply toothed. Perianth elongate, 3-gonous above, mouth truncate-lacerate, laminae erect or spreading.

**Northern** Island: Patea village, on the ground, *Colenso*.

### 3. **PLAGIOCHILA**, Nees and Montagne.

Stems from a creeping rhizome, erect, ascending, or creeping, often large and rigid. Leaves distichous, succubous, dorsal margin decurrent and reflexed, often obliquely. Stipules 0 in the New Zealand species. Fruit terminal or lateral. Involucre leaves 2, larger than the cauline. Perianth compressed at right angles to the insertion of the leaves; mouth truncate, entire or toothed. Calyptra membranous. Capsule on a long or short fruitstalk, ovoid; elaters with 2 spiral fibres. Antheridia covered by small imbricated ventricose perigonial leaves.

One of the largest genera of *Hepaticæ*, found in all parts of the world. Of the following sections, § 1 is well marked, but the others are often difficult of recognition. The species are very puzzling to identify.

§ 1. *Leaves opposite, vertical, connate at the base.*

1. **P. conjugata**, *Lindb.—Fl. N. Z. ii. 130*. Stems creeping; branches erect, proliferously divided, stoloniferous. Leaves obliquely orbicular-reniform, denticulate and ciliate. Perianth terminal, obconic; mouth truncate, denticulate and ciliate.—*Hook. Musc. Exot. t. 91*; *Syn. Hep. 52*.

**Middle** Island: Dusky Bay, *Menzies*.

2. **P. connexa**, *Hook. f. and Tayl. Fl. N. Z. ii. 130*. Stems sparingly-branched, olive-brown or yellow, 1 in. high; apices incurved. Leaves orbicular, lower entire, upper subdenticulate.—*Syn. Hep. 648*.

**Northern** Islands: Bay of Islands, *A. Cunningham*.—There are no specimens of this in *Herb. Hook*.

3. **P. prolifera**, *Mitten in Fl. N. Z. ii. 131. t. 94. f. 5*. Stems 2-3 in. long, creeping. Leaves rather remote, orbicular, toothed; involucre spinulose. Perianth obovate, compressed; mouth toothed. Male spikes fascicled, flagelliform, with attenuated apices.

**Northern** Island: Bay of Islands, *J. D. H.*

§ 2. *Stems sparingly branched. Leaves alternate, concave, more horizontal than vertical. Lower margin not much decurrent nor recurved.*

4. **P. circinalis**, *Lehm.;—Fl. Antarct. i. 348*. Stems tufted, erect,



branching, stout, 1–3 in. high, olive-brown. Leaves closely imbricate, erecto-patent, obliquely cordate, concave, quite entire or minutely toothed; margins recurved, dorsal gibbous; involucre similar, but large. Perianth obconic, compressed; mouth entire or slightly toothed.—Syn. Hep. 53, 652. *P. he-micardia*, Fl. Antarct. 148. t. 63. f. 2; Syn. Hep. 627.

**Lord Auckland's** group and **Campbell's** Island: on rocks on the hills, *J. D. H.* (Australia.)

5. **P. pleurota**, *Hook. f. and Tayl. Fl. Antarct.* 149. t. 63. f. 4;—*Fl. N. Z.* ii. 135. Stems tufted, erect, rigid, 1 in. high, sparingly branched, yellow-green. Leaves lax, erecto-patent, obovate, rather obtuse, sparingly irregularly toothed; ventral margin slightly decurrent and recurved. Perianth exserted, narrow obovate, almost winged; mouth contracted, toothed.—Syn. Hep. 633. *P. cognata*, l. c. 14. t. 53. f. 3; Syn. Hep. 625.

**Middle** Island: Port William, *Lyall*. **Lord Auckland's** group on moist stones, etc., *J. D. H.*—Nearly allied to *P. Dicksoni*, but not dendroid, and leaves more obovate.

6. **P. fuscella**, *Hook. f. and Tayl. Fl. Antarct.* 149. t. 63. f. 5. Stems loosely tufted, patent, ascending, vaguely branched, brown or blackish, 1–1½ in. high; apices incurved. Leaves crisped when dry, erecto-patent, obliquely orbicular-oblong; dorsal margin subrecurved, ventral subserrulate recurved. Perianth obovate, immersed, truncate, deflexed.—Syn. Hep. 648.

**Lord Auckland's** group: in boggy places, *J. D. H.*

§ 3. *Leaves more or less vertical, alternate, the margins recurved, dorsal decurrent.*

† *Stems erect from a creeping rhizome, tall, very much branched in a tree-like or fascicled manner. Leaves toothed and usually spinulose.*

7. **P. Stephensoniana**, *Mitten in Fl. N. Z.* ii. 133. t. 95. Stems 4–10 in. high, 2–3-pinnately branched. Leaves olive-green, ovate or obliquely cordate, subquadrate at the apex; dorsal margin quite entire, ventral spinulose; involucre similar, more toothed. Perianth on short proper branches, ovate, compressed; mouth toothed.

**Northern** and **Middle** Islands: in ravines, common, *Colenso*, *Lyall*, *Stephenson*, etc.—A magnificent plant, the noblest of all *Hepaticæ*.

8. **P. gigantea**, *Lindb.*;—*Fl. N. Z.* ii. 133. Stems ascending, fastigiate divided in a fan-shaped manner, recurved. Leaves spreading, orbicular-quadrate, sharply denticulate and ciliate, nearly entire at the base. Perianth oblong, compressed; mouth ciliate, dilated.—*Hook. Musc. Exot.* t. 93; Syn. Hep. 51.

Abundant throughout the **Northern** and **Middle** Islands, *Menzies*, etc.

9. **P. ramosissima**, *Lindb.*;—*Fl. N. Z.* ii. 133. Stems erect, excessively fastigiate branched. Leaves subopposite, erecto-patent, orbicular-ovate; dorsal margin quite entire, ventral spinulose dentate at the apex. Perianth urceolate; mouth truncate, compressed, ciliate.—*Hook. Musc. Exot.* t. 92; Syn. Hep. 58.

**Middle** Island: Dusky Bay, *Menzies*; Port Preservation, *Lyall*.

10. **P. Arbuscula**, *Lehm. and Lindb.*;—*Fl. N. Z.* ii. 132. Stems erect,

much branched, dendroid. Leaves spreading, imbricate, dimidiate-ovate, acuminate; ventral margin and apex toothed, with a terminal spine. Perianth terminal and on the forks, long exserted, oblong; mouth compressed, 2-labiate, lips acute, ciliate-toothed.—Syn. Hep. 27.

Abundant throughout the **Northern and Middle Islands**, *Cunningham*, etc. (Java.)

11. **P. fasciculata**, *Lindl.*;—*Fl. N. Z.* ii. 132. Stems ascending, dichotomous below, fastigiately branched above. Leaves obliquely orbicular-oblong, convex; ventral margin and apex unequally toothed. Perianth lateral and on the forks, long exserted, obovate; mouth compressed, obliquely truncate, ciliate.—Syn. Hep. 27; *Fl. Tasm.* ii. 224. *P. Colensoi*? Taylor in *Lond. Journ. Bot.* 1846, 269.

**Northern and Middle Islands**: common on trees, *J. D. H.*, etc. **Lord Auckland's** group, *J. D. H.* (Tasmania.)

12. **P. Dicksoni**, *Hook. f. and Tayl. Fl. N. Z.* ii. 134. *t.* 96. *f.* 3. Stems erect, flexuous, 2–3 in. high, sparingly branched in a dendroid manner. Leaves spreading, ovate-oblong, truncate and 2–3-toothed at the apex; dorsal margin quite entire, ventral sparingly toothed; involucre broader, spinulose. Perianth elongate-obovate, compressed; lips rounded, toothed.—Syn. Hep. 637.

**Northern and Middle Islands**, *Menzies*, etc.—This is sometimes as little branched as the following, or indeed less so, and both of them may be referred to either section of these two.

†† *Stems not dendroid nor fasciculately branched, either simple or dichotomous or sparingly divided.*

*a. Leaves entire or very slightly toothed, or 1–2-toothed at the apex.*

13. **P. ansata**, *Hook. f. and Tayl. Fl. Antarct.* 425. *t.* 156. *f.* 6;—*Fl. N. Z.* ii. 131. Stems suberect, tufted, nearly simple, 1–1½ in. high. Leaves red-brown, closely imbricate, suberect, appressed, flat, obliquely-orbicular, quite entire; involucre truncate, the dorsal margin toothed at the base. Perianth obconic, compressed; mouth denticulate.—Syn. Hep. 649.

**Middle Island**: Port William, *Lyall*. (Falkland Islands.)

14. **P. microdictyum**, *Mitten in Fl. N. Z.* ii. 131. *t.* 94. *f.* 6. Stems 2–3 in. high, slender, sparingly branched; branches with incurved tips. Leaves green, spreading, closely imbricate, deltoid-ovate, the angles rounded; dorsal margin quite entire, ventral sometimes slightly toothed; involucre a little toothed; perianth oblong, compressed; lips ciliate-toothed.

**Northern and Middle Islands**: Bay of Islands, *J. D. H.*, with *P. prolifera* and *Sendtnera attenuata*; Otago, *Hector* and *Buchanan*.

15. **P. radiculosa**, *Mitten in Fl. N. Z.* ii. 133. *t.* 96. *f.* 1. Stems 2–3 in. long, prostrate, rooting; branches few, ascending. Leaves green, imbricate, diverging, obliquely oblong-cordate, 1–2-toothed at the apex or quite entire, dorsally very decurrent; involucre broader, toothed and ciliate. Perianth immature, compressed, broadly obconic; mouth truncate, toothed.

**Northern Island**: on *Weinmannia* bark, Tarawera, *Colenso*.

*β. Leaves much toothed and spinulose.*

16. **P. deltoidea**, *Lindb.*;—*Fl. N. Z.* ii. 131. Variable in size and

form; stems erect; branches somewhat fascicled, 2-4 in. high. Leaves vertical, closely imbricate, subsecund, rhomboid-obovate; dorsal margin quite entire; ventral arched and the apex toothed. Perianth terminal, ovate, compressed; mouth toothed and ciliate.—Syn. Hep. 55. *P. gregaria*, Hook. f. and Tayl. in Lond. Journ. Bot. 1844, 564; Syn. Hep. 654. *P. læta*, Mitten.

**Northern and Middle Islands:** common, on stumps of trees, etc., from the Bay of Islands, *J. D. H.*, to Thomson Sound, *Lyall*. (Tasmania.)

17. ***P. annotina***, *Lindb.*;—*Fl. N. Z.* ii. 131. Stems stout, erect, 3-5 in. high, dichotomous. Leaves very closely imbricate, dimidiate-ovate, convex, obtuse, toothed and ciliate; ventral bases conniving and forming a crest. Perianth terminal and lateral, oblong, with a narrow toothed wing; mouth truncate, compressed, fimbriate.—Syn. Hep. 41, 643. *J. adiantoides*, Hook. Musc. Exot. t. 90.

**Northern and Middle Islands:** on trees; Tarawera, *Colenso*; Dusky Bay, *Menzies*; Otago, *Hector and Buchanan*; Southern Island, *Lyall*. (Tasmania.)

18. ***P. incurvicolla***, *Hook. f. and Tayl.*;—*Fl. N. Z.* ii. 132. t. 96. f. 2. Stems suberect, 2 in. high, sparingly branched, flexuous; tips decurved. Leaves close-set, brown-green, rigid, spreading, ovate or obovate, coarsely spinous-toothed all round. Perianth narrow, oblong-clavate, compressed; tips rounded, toothed.—Syn. Hep. 651.

**Northern and Middle Islands:** Auckland, *Sinclair*; Wairarapa valley, *Colenso*; Milford Sound, etc., *Lyall*; Otago, *Hector and Buchanan*. Allied to *P. fasciculata*, but not branched like that plant.

19. ***P. Lyallii***, *Mitten in Fl. N. Z.* ii. 132. Stems erect, dichotomously and fastigately branched, slender, flexuous, 2-3 in. high. Leaves brown-green, rather remote and rigid, broadly ovate or semicordate; dorsal margin quite entire; ventral and apex spinous; involucre similar, more toothed. Perianth as in *P. incurvicolla*, from which it differs in the entire dorsal margin of the leaf.

**Northern and Middle Islands:** Auckland, *Sinclair*; Port Preservation, *Lyall*. The description and figure of the perianth in the Flora of N. Z. represent it as too short and broad. This again most closely resembles *P. fasciculata*. (Tasmania.)

20. ***P. Sinclairii***, *Mitten in Fl. N. Z.* ii. 132. t. 96. f. 5. Stems 4-5 in. long, erect, strict, sparingly branched. Leaves loosely imbricate, olive-brown, divergent, obliquely ovate-oblong, obtuse; dorsal margin reflexed, quite entire; ventral and apex spinulose, lower orbicular. Perianth  $\frac{1}{8}$  in. long, terminal, oblong-ovate, compressed; mouth truncate, toothed.

**Northern Island:** Auckland, *Sinclair*; Tehawera, *Colenso*; Port Nicholson, *Mantell*. A noble species.

#### 4. **LEIOSCYPHUS**, Mitten.

Stems prostrate, creeping or ascending; branches spreading. Leaves succubous, spinulose, distichous, close set, entire, rarely 2-fid. Stipules small, 2-4-fid. Fruit terminal. Involucral leaves like the cauline. Perianth dilated upwards, compressed at right angles to the direction of the leaves; mouth entire or toothed. Capsule on a slender fruitstalk. Antheridia as in *Chiloscyphus*.

1. **L. repens**, *Mitten in Fl. N. Z.* ii. 134. t. 97. f. 1. Stems creeping, 1 in. long, sparingly branched. Leaves pale green, spreading, close set, ovate, 2-toothed; dorsal margin straight, ventral arched; cells rounded. Stipules 2-fid; teeth subulate, 1-toothed, decurrent and united to the leaf below. Perianth elongate, obovate, much compressed; mouth toothed.

**Northern** Island: Bay of Islands, creeping over *Lepidozia Lindenberghii*, *J. D. H.* Similar to *Lophocolea bidentata*, but differing remarkably in the perianth.

2. **L. chiloscypchoideus**, *Mitten in Fl. Tasman.* ii. 225. Stem creeping, sparingly branched. Leaves subimbricate, semi-vertical, convex, orbicular; dorsal margin reflexed. Stipules small, free, distant, ovate, 2-partite; segments subulate, flexuous; margins 1-toothed. Perianth elongate, obliquely obovate; lips dilated, incurved.—*Chiloscypchus amphibolius*, Nees, and *retusatus*, Hook. f. and Tayl. *Fl. Antarct.* 441. t. 161. f. 3. *Plagiochila*, Syn. Hep. 647.

**Lord Auckland's** group: on bark of trees, etc., *J. D. H.* (Tasmania, Fuegia, Falkland Islands.)

3. **L. turgescens**, *Mitten*.—*Jungermannia*, Hook. f. and Tayl. *Fl. Antarct.* i. 150. t. 64. f. 2. Stems procumbent, sparingly branched,  $\frac{1}{2}$ –1 in. high, curved. Leaves pale olive-green, closely imbricate, suberect, secund, very concave, orbicular-reniform, quite entire, pellucid; ventral margin decurrent. Stipules obovate or orbicular, entire or 2-fid. Perianth oblong, truncate, compressed; mouth entire or obscurely lobed.—Syn. Hep. 671.

**Lord Auckland's** group: on the ground near the hilltops, *J. D. H.* Perhaps a *Chiloscypchus*, like the *C. notophylla*.

4. **L. stronglylophylla**, *Mitten*.—*Jungermannia*, Hook. f. and Tayl. *Fl. Antarct.* i. 146. t. 62. f. 9. Minute, stems tufted, slender, curved, sparingly branched. Leaves very minute, greenish-brown, loosely imbricate, suberect, orbicular, concave, quite entire, pellucid, truncate, 2-fid; involucre oblong-obovate, longer than the perianth. Stipules small. Perianth oblong, subcompressed; mouth rounded, 2-lipped.

**Lord Auckland's** group and **Campbell's** Island, amongst grass, roots of trees, etc., *J. D. H.*

## 5. LOPHOCOLEA, Nees.

Stems prostrate, creeping. Leaves succubous, distichous, flaccid, decurrent at the base, 2-multifid. Stipules 2–4-cleft. Fruit terminal. Involucre of 2–4 large leaves. Perianth tubular below, 3-gonous above; lobes toothed and crested. Calyptra short, membranous, rupturing transversely at the base or irregularly at the apex. Capsule on a slender fruitstalk, oblong; elaters and antheridia as in *Chiloscypchus*.

A large genus, widely distributed.

\* *Stipules connate by the decurrent bases on one or both sides, with the leaves below them.*

1. **L. pallida**, *Mitten*;—*Fl. N. Z.* ii. 135. Stems 1 in. long, prostrate, sparingly branched or simple. Leaves almost opposite, pale green, ovate, obtuse retuse or minutely 2–3-toothed; involucre similar or toothed on the ventral margin; cells large. Stipules appressed, 4-toothed; involucre ovate, 2-fid, entire or toothed. Perianth 3-winged; wings and mouth



toothed.—*L. multipenna*, in part, of Fl. Antarct. 155. ?*L. connata*, Swartz, of Montagne in Voy. au Pôle Sud, 255.

**Northern Island:** Auckland, *Sinclair*. **Lord Auckland's group**, *J. D. H.*, mixed with *L. decipiens* and *Leioscyphus chiloscypchoideus*. The description in Fl. Antarct. is very inaccurate, owing to the intermixture of these species. Odour sweet.

2. ***L. heterophylloides***, *Nees*;—*Fl. N. Z.* ii. 135. Stems  $\frac{1}{2}$  in. long, procumbent, nearly simple. Leaves yellow-green, imbricate, horizontal or semivertical, flat, orbicular-ovate, rather retuse. Stipules 2-fid, ciliate, toothed at the base, decurrent and connate on one side to the leaf below. Perianth triquetrous; mouth 3-lipped, toothed.—Syn. Hep. 157. *Chiloscyphus canaliculatus*, Hook. f. and Tayl. Lond. Journ. Bot. 1844, 563 (perianth inaccurately described); Syn. Hep. 710.

**Northern and Middle Islands:** from the Bay of Islands, *J. D. H.*, to Canterbury, *Lyall*. (Tasmania.) Often fragrant.

3. ***L. biciliata***, *Mitten* in *Fl. N. Z.* ii. 137. t. 97. f. 4. Stem 1 in. long, procumbent, nearly simple. Leaves broad, spreading, brownish-green, loosely imbricate, deltoid-ovate, truncate and 2-toothed, teeth slender. Stipules small, 2-partite; segments 2-toothed on one side.—*Chiloscyphus*, Hook. f. and Tayl. in Lond. Journ. Bot. 1845, 84; Syn. Hep. 707.

**Northern Island**, *Colenso*. (Specimens imperfect, and affinity doubtful.)

4. ***L. Colensoi***, *Mitten* in *Fl. N. Z.* ii. 138. t. 97. f. 6. Stems 2–3 in. long, creeping, branched. Leaves brownish-green, imbricate, ovate-oblong, truncate, shortly 2-dentate; teeth sometimes obsolete. Stipules 2-partite; segments 1-toothed on each side.

**Northern Island:** East Coast, on wood, *Colenso*. The largest known species of the genus.

5. ***L. subporosa***, *Mitten* in *Fl. N. Z.* ii. 137. t. 97. f. 3. Stems 1 in. high, creeping, branched. Leaves pale green, imbricate, rather rigid; ovate, 2-dentate; cells unequal, involucre spinulose. Stipules 4-toothed, narrowly decurrent on one or both sides. Perianth narrow-oblong, 3-gonous, dorsal angle with a toothed wing; laminæ subobtuse, entire or toothed.

**Northern Island:** Auckland, *Sinclair*; Wellington, *Stephenson*.

5. ***L. triacantha***, *Hook. f. and Tayl.*;—*Fl. N. Z.* ii. 138. Stems 2 in. long, creeping, branched. Leaves spreading, flat, fuscous-green, close-set; ovate-quadrate, truncate and 3-cuspidate. Stipules palmately 4-fid; segments setaceous, one side decurrent. Perianth unknown.

**Northern and Middle Islands:** hills at Pahiatua, *Colenso*; Akaroa, *Raoul*; Port Nicholson, *Mantell*.

6. ***L. leucophylla***, *Tayl.*;—*Fl. N. Z.* ii. 138. Stems 2–3 in. long, slender, creeping, branched. Leaves pale greenish or whitish-brown, closely imbricate, rather horizontal than vertical, convex, membranous, cellular, pellucid, triangular-ovate; margins strongly recurved, broadly connate, with the stipules, sharply toothed all round. Perianth terminal; laciniae entire, obtuse.—*Chiloscyphus*, Fl. Antarct. 157. t. 65. f. 4; Syn. Hep. 181 and 706.

**Northern Island:** top of the Ruahine mountains, *Colenso*.

**Lord Auckland's** group: on the ground, *J. D. H.*

A beautiful and very peculiar species. The character of the original *L. leucophylla*, Tayl. (published in Syn. Hep. 155, from Herb. Greville), differs totally from this, but as the authors of that work cite this as synonymous with the present *Chiloscyphus leucophyllus* (Lond. Journ. Bot. 1844, 348), it is better to retain this name, and abolish the *L. leucophylla*, whatever it may have been.

\*\* *Stipules free.*

† *Leaves entire or nearly so.*

7. **L. novæ-Zelandiæ**, *Nees*;—*Fl. N. Z.* ii. 135. Stems procumbent, branched. Leaves yellowish-green, cellular, imbricate, spreading, orbicular-quadrate, quite entire or slightly emarginate; involucre oblique, 2-toothed. Stipules free, ovate, reflexed, 2-fid. Perianth terminal, obovate, 3-gonous, wingless, 3-fid; segments unequally toothed.—*L. subviridis*, *Fl. Antarct.* 438. t. 159. f. 4. *L. rivalis*, 437. t. 158. f. 7. *L. sabuletorum*, 437. t. 158. f. 8. *J. subintegra*, 443. t. 160. f. 5.

Common throughout the **Northern** and **Middle** Islands, and very variable indeed, *Menzies*, etc. **Lord Auckland's** group, *J. D. H.* Often fragrant. (Tasmania, Falkland Islands.)

8. **L. australis**, *Mitten*;—*Fl. Tasman.* ii. 226 in note. Stems 1 in. long, suberect or procumbent and rooting, branched. Leaves dark brown, upper closely imbricate, appressed, erect, orbicular, concave, quite entire or obscurely lobed; cells large, opaque. Stipules 2-partite, variously toothed. Perianth curved, oblong, cylindric below, 3-gonous above, angles undulate; lips crenulate.—*Chiloscyphus*, *Fl. Antarct.* 156. t. 65. f. 3 (perianth erroneously described); *Syn. Hep.* 189. 709.

**Lord Auckland's** group and **Campbell's** Island: moist banks, etc., common, *J. D. H.*

10. **L. planiuscula**, *Hook. f. and Tayl. Fl. Antarct.* 156. t. 65. f. 2. Stems 2 in. long, procumbent, flaccid, branched. Leaves purplish, variable in size, very membranous, pellucid, distichous, orbicular-ovate, quite entire, base broad, decurrent; tips recurved, margins sometimes waved. Stipules 2-fid, entire or 1-toothed on each side.—*Syn. Hep.* 165.

**Lord Auckland's** group: wet rocks near the sea, *J. D. H.*

†† *Leaves 2-fid or 2-dentate at the apex (not serrate).*

11. **L. bidentata**, *Nees*;—*Fl. N. Z.* ii. 136. Stems variable in length, sparingly branched, prostrate. Leaves divaricating, flat, pale green, triangular-ovate, flaccid, 2-dentate, with a shallow sinus. Stipules small, distant, 2-partite; segments 2-fid, entire or toothed. Perianth subsessile, angles not or slightly winged; mouth lacinate and toothed.—*Syn. Hep.* 159. *J. recurvifolia*, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1844, 562. *J. leptantha*, *J. divaricata*, and *J. alternifolia*, *Fl. Antarct.* t. 159. f. 6, and 161. f. 2 and 8. *J. textilis*, *Fl. Antarct.* 435. t. 158. f. 9; *Fl. N. Z.* ii. 137.

**Northern** Island: Bay of Islands, *J. D. H.* A very common and variable plant, found in many parts of the world and throughout the temperate regions, to which I suspect some of the following species of this section may be referable.—*L. textilis* differs only in the larger cells of the foliage.

12. **L. bispinosa**, *Hook. f. and Tayl. Fl. Antarct.* 153. t. 64. f. 7. Stems

$\frac{1}{2}$ – $\frac{1}{3}$  in. long, creeping and rooting, slender, tips ascending. Leaves straw-coloured, loosely set, erecto-patent or suberect, oblong-ovate or subquadrate, 2-fid; segments spreading, acuminate. Stipules minute, 2-partite; segments subulate, entire or 1-toothed at the base, rarely multifid.—Syn. Hep. 162. *J. perpusilla*, Fl. Antarct. 154. t. 64. f. 9; Syn. Hep. 163.

**Campbell's** Island: moist trunks of trees, etc., *J. D. H.*—Closely allied to *L. bidentata*, but pale straw-coloured; leaves more deeply 2-fid and cells minute.

13. **L. lenta**, *Hook. f. and Tayl. Fl. Antarct.* 154;—*Fl. N. Z.* ii. 136. t. 97. f. 2. Habit and foliage of *L. bispinosa*, but more erect. Leaves spreading and greener. Perianth with spinulose wings and tips.—Syn. Hep. 692. *J. diademata*, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1844, 560; Syn. Hep. 692. *J. secundifolia*, Fl. Antarct. 438. t. 159. f. 2; Syn. Hep. 693.

**Northern** and **Middle** Islands: Bay of Islands, *J. D. H.*; Wairarapa valley, etc., *Colenso*; Otago, *Hector and Buchanan*. **Lord Auckland's** group: on trunks of trees, *J. D. H.* (Tasmania, Fuegia, etc.)—Scarcely different from *L. bidentata*.

14. **L. spinifera**, *Hook. f. and Tayl. Fl. Antarct.* 155. t. 65. f. 1;—*Fl. N. Z.* ii. 137. Stems  $\frac{1}{2}$  in. long, prostrate, subpinnately branched. Leaves yellow or whitish-green, closely imbricate, 2-fid, sinus obtuse, margin recurved, dorsal very decurrent; cells large, lax. Stipules large, broad, reniform, 6-fid, divisions subulate; involueral toothed all round; teeth recurved. Perianth ovate, angles winged and toothed above, tips toothed and lacerate.—Syn. Hep. 163 and 693.

**Northern** Island: Auckland, *Sinclair*; Wellington, *Stephenson*. **Lord Auckland's** group: on the hills, *J. D. H.*—The large stipules best characterize this.

15. **L. allodonta**, *Hook. f. and Tayl. Fl. Antarct.* 155; *Fl. N. Z.* ii. 137. t. 97. f. 5. Stems 2 in. long, prostrate, rooting. Leaves dull green, widely spreading, distichous, horizontal, imbricating, membranous, alternate, ovate-oblong, obtuse or truncate, 2-dentate or with 2 spinous processes separated by a shallow sinus. Stipules minute, 2-partite.—Syn. Hep. 163 and 693.

**Northern** Island: Tarawera, on *Weinmannia* trees, *Colenso*. **Lord Auckland's** group: on bark, *J. D. H.*—Closely allied to *L. biciliata*, etc. Odour strong, aromatic.

††† *Leaves toothed.*

16. **L. muricata**, *Nees*;—*Fl. N. Z.* ii. 138. Stems minute,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, procumbent, branched. Leaves close-set, pale, subhorizontal, and stipules subquadrate-ovate, acutely 2-dentate, spinulose ciliate, muricate with short hairs above. Perianth terminal, ovate, plaited; mouth 5–6-fid.—Syn. Hep. 169, 703.

**Northern** and **Middle** Islands: amongst mosses, etc., probably common. Ruahine range and Tehawera, *Colenso*; Wellington, *Stephenson*; Port William, *Lyall*. (Tasmania, S. Africa.)

## 6. SCAPANIA, Lindenb.

Stems erect or ascending. Leaves succubous, distichous, concave or complicate, 2-lobed. Stipules 0. Fruit terminal. Involueral leaves 2, larger than the cauline. Perianth compressed parallel to the direction of the

leaves; mouth entire or ciliated. Capsule on a slender fruitstalk, ovoid; elaters with 2 spiral fibres. Antheridia in the forks of 2-lobed perigonial leaves.

A small genus, native of the north and south temperate zones, rare in the tropical.

1. **S. densifolia**, *Nees*.—*S. vertebralis*, *Gottsch.*;—*Fl. Antart.* 153. Stems 3–4 in. high, erect, rarely branched. Leaves olive-green or brown, distichous, crowded, vertical, spreading, 2-fariously imbricate, 2-fid, ciliated; lobes incurved, twisted.—*Syn. Hep.* 73; *Hook. Musc. Exot.* t. 36.

**Lord Auckland's** group: on trees, rare, *J. D. H.* (Tasmania.)

A most beautiful plant, originally described as from Staten Land, but probably erroneously, and brought from Dusky Bay by Menzies, who confounded the habitats of several of his plants.

## 7. GOTTSCHIA, *Nees*.

Stems erect or suberect from a creeping rhizome, simple, rarely branched, very stout, fleshy and cellular. Leaves succubous, very large, distichous, cellular, and fleshy, 2-lobed, complicate, serrate or pinnatifid; lobes sometimes lamellate. Stipules rarely absent. Fruit terminal in the hollowed apex of the stem. Involucre tubular, with a lacerate mouth, or formed of imbricating stipular leaves, free or connate with the tumid apex of the stem, together forming the perianth. Calyptra ovate. Capsule on a stout fruitstalk, oblong or ovoid; elaters with 2 spiral filaments. Antheridia in ventricose imbricate perigonial leaves similar to the cauline.

A noble genus, almost confined to the southern temperate hemisphere, and most abundant in New Zealand.

\* *Leaves stipulate.*

† *Leaves with toothed ridges or crests on the blade.*

1. **G. Lehmaniana**, *Lindb.*;—*Fl. N. Z.* ii. 151. Stem 2–3 in. high. Leaves ovate-oblong, crested with short lamellæ, serrate, ventral lobe ovate-lanceolate, dorsal as long. Stipules ovate, 2–4-fid; segments ciliate, furnished at the base with pinnatifid leaflets. Perianth terminal; involucre leaves connate, subpinnatifid at the apex, acute, ciliate-serrate.—*Syn. Hep.* 20; *Mont. Voy. au Pôle Sud*, 276. t. 16. f. 1. *G. Hombroniana*, *Mont.*

**New Zealand**, *Banks and Solander*. **Middle Island**: Chalky Bay, *Lyall*. **Lord Auckland's** group, *Hombron*, *J. D. H.* (Australia, Tasmania.)

2. **G. glaucescens**, *Nees*;—*Fl. N. Z.* ii. 151. Stems 3–4 in. high, covered with hairs and leafy scales. Leaves glaucous, ovate-oblong, pubescent and with ciliate erect lamellæ, unequally 2-fid to the middle; lobes obtuse; dorsal ovate, one-third shorter than the oblong ventral, ciliate. Stipules orbicular, 4-fid, pubescent and ciliate-serrate. Perianth terminal, cylindric-oblong; involucre leaves elongate, margins reflexed, closely ciliate; mouth obliquely truncate toothed.—*Syn. Hep.* 20; *Hook. Musc. Exot.* t. 39.

**Northern and Middle Islands**: Wairarapa valley, *Cotenso*; Otago, *Hector and Buchanan*; Port William and Port Preservation, *Lyall*.

3. **G. Balfouriana**, *Hook. f. and Tayl. Fl. N. Z.* ii. 151. t. 101. f. 2. Stems 1–3 in. high, covered with ciliated scales. Leaves pale green,



crowded, oblong-lanceolate, obtuse, toothed and ciliate; ventral lobe oblong, falcate, with 3 short-toothed lamellæ; dorsal  $\frac{1}{2}$ -ovate. Stipules suborbicular, 4-fid; segments obtuse, toothed and ciliate.—Syn. Hep. 622.

**Northern and Middle Islands, Colenso, Stanger; Chalky Bay, Lyall. Lord Auckland's group, J. D. H.**

4. **G. repleta**, Hook. f. and Tayl. *Fl. N. Z.* ii. 153. t. 101. f. 3. Stems 1–2 in. high, covered below with purple radicles, glabrous above. Leaves yellow-green, erecto-patent, imbricate, amplexicaul, ovate-oblong, margins sharply toothed; ventral lobe broadly ovate-lanceolate, subacute, with 3–4-toothed lamellæ; dorsal much shorter, obliquely orbicular-ovate. Stipules imbricate, oblong, 2-fid; segments 2-partite, toothed and ciliate.—Syn. Hep. 622.

**Northern and Middle Islands, Colenso; Port William, Lyall.**

5. **G. unguicularis**, Hook. f. and Tayl. *Fl. N. Z.* ii. 151. t. 102. f. 1. Stems 1 in. long, covered below with purple radicles, above with scattered 2-fid or toothed scales. Leaves pale green, imbricate, spreading, toothed; ventral lobe oblong-obtuse, with few short lamellæ; dorsal broadly ovate, much smaller. Stipules 4-fid; segments toothed and ciliate. Involucre elongate, loosely clothed with leaves which do not sheath.—Syn. Hep. 622.

**Northern and Middle Islands, Colenso; Auckland, Sinclair and Bolton; Nelson, Mantell.**

†† *Leaves without lamellæ.*

6. **G. appendiculata**, Nees;—*Fl. N. Z.* ii. 150. Stems 4–6 in. high. Leaves very large, yellow-green, oblong; ventral lobe ovate-oblong, pinnatifid at the apex; laminæ serrulate; dorsal  $\frac{1}{4}$  shorter, dimidiate-ovate, acute, sharply toothed. Stipules 2-partite; laminæ inciso-serrate. Involucre formed of the uppermost leaves and stipule, cup-shaped; mouth cut into 8–9 equal toothed segments.—Syn. Hep. 14; Hook. Musc. Exot. t. 15.

**Northern and Middle Islands: Auckland, Sinclair; Hokianga, Sinclair; Dusky Bay, Menzies; Port Cooper, Lyall; Otago, Hector and Buchanan.**

7. **G. nobilis**, Nees;—*Fl. N. Z.* ii. 151. Stems 3–8 in. high, stout, almost woody, with tufted leaflet-like scales at the bases of the leaves. Leaves yellow-green, 2-fid to the middle; lobes ovate, acute, spinulose-serrate; dorsal  $\frac{1}{4}$  shorter. Stipules suborbicular, 2-dentate, spinulose-serrate. Perianth terminal, ovoid, subpicate; mouth with serrate laciniae.—Syn. Hep. 21; Hook. Musc. Exot. t. 11.

**Northern and Middle Islands: Tararua, Colenso; Dusky Bay, Menzies; South Land, Lyall; Otago, Hector and Buchanan.**

8. **G. ciliata**, Mitten in *Fl. N. Z.* ii. 151. t. 101. f. 4. Stems 2–3 in. high, glabrous. Leaves purplish-green, closely imbricate, very broadly ovate, ciliated all round with hair-like cilia; lobes nearly equal. Stipules 2–4-fid; lobes rounded, long, ciliated.

**Northern Island: creeping on fern fronds, Ruahine range, Colenso. (Tasmania.)**

9. **G. splachnophylla**, Hook. f. and Tayl. *Fl. Antarct.* 424. t. 156. f. 2;—*Fl. N. Z.* ii. 150. Stem procumbent, 2 in. high, very succulent and

fragile, covered with rootlets. Leaves dull olive-green or whitish, very thick, fleshy, brittle; ventral lobe ovate-oblong, truncate, entire; dorsal shorter, broadly ovate or semicordate, also truncate, both often crenate at the apex. Stipules suborbicular or oblong, retuse or 2-fid.—? *G. pachyphylla*, Nees, Syn. Hep. 621; Fl. Antarct. 147.

**Northern Island**: summit of the Ruahine mountains, *Colenso*.

? **Lord Auckland's group**: on the hills, *J. D. H.*—A very difficult plant to dissect after being dried. Of the Auckland Island plant referred to *G. pachyphylla* (a *Tristan d'Acunha* species), there were but a few scraps, which, after examination by Dr. Taylor, were not returned to Kew. Mr. Mitten suspects that they are referable to this. (*Fuegia*.)

\*\* *Stipules* 0.

10. ***G. pinnatifolia***, *Nees*;—*Fl. N. Z.* ii. 149. Stems 2–3 in. high. Leaves dull green, closely imbricate, obliquely ovate-acuminate or ovate-lanceolate, irregularly toothed and ciliate; dorsal lobe nearly as long as but narrower than the ventral; involucre toothed. Stipule 0. Perianth cylindrical-oblong; mouth 5-lobed; lobes toothed.—Syn. Hep. 22; Hook. Musc. Exot. t. 114; Fl. Antarct. 147. t. 63. f. 1. *G. ciliigera*, Hook. f. and Tayl. in Lond. Journ. Bot. iii. 376.

**Northern and Middle Islands**: Tararua range, *Colenso*; Dusky Bay, *Menzies*; Port William, *Lyall*; Otago, *Hector* and *Buchanan*. **Lord Auckland's group**, *J. D. H.* (Tasmania.)

11. ***G. tuloides***, *Hook. f. and Tayl. Fl. N. Z.* ii. 150. t. 101. f. 1. Stems short, stout, 1 in. long, broad. Leaves dark green, imbricate, spreading, with minute asperities on the surface towards the apex, toothed; ventral lobe ovate-lanceolate, acute, concave; margin flat; dorsal shorter, ovate, truncate, anterior margin recurved; involucre free, sheathing. Stipule 0.—Syn. Hep. 626.

**Northern and Middle Islands**: forests on the east coast, *Colenso*; Port Preservation, *Lyall*.

## 8. CHILOSCYPHUS, Corda.

Stems prostrate, creeping, rooting from the bases of the stipules. Leaves succubous, distichous, decurrent. Stipules often decurrent and connate with the leaves below them. Fruit terminal on very short lateral branches. Involucre of 2–6 leaves. Perianth 2–3-partite. Calyptra herbaceous, globose or clavate, often longer than the perianth, bursting irregularly at the apex. Capsule ovoid, on a slender fruitstalk; elaters with 2 spiral fibres. Anthridia in the saccate dorsal bases of perigonal leaves which resemble the cauline.

Similar in habit to *Lophocolea*, with which some of the species are probably confounded.

A large genus found in all temperate and many tropical parts of the world. In *C. Billardieri*, the commonest species, the character of leaves connate at the base or free, and entire at the apex or toothed, breaks down. I suspect that a good many of the following species will be found very unstable.

§ I. *Leaves opposite. Stipules united to both the leaves below them by their decurrent margins.*

\* *Leaves united by their dorsal bases (sometimes free in J. Billardieri).*

† *Leaves entire or nearly so at the apex.*

***C. Menziesii***, *Mitten in Fl. N. Z.* ii. 139. t. 98. f. 1. Stem 1 in. long,

creeping, flexuous, branched. Leaves brownish-green, opposite; dorsal bases connate, broadly ovate or  $\frac{1}{2}$ -orbicular, obtuse, quite entire, thick, succulent; involucrel concave denticulate. Stipules ovate, 2-dentate; margins obtusely 3-denticulate, broadly connate with the leaves. Perianth campanulate; teeth of the mouth short, incurved.

**Middle Island**: Dusky Bay, *Menzies*, on Lichens; Port Preservation, on bark of trees, *Lyall*. **Lord Auckland's** group, *J. D. H.*

2. **C. Billardieri**, *Nees*;—*Fl. N. Z.* ii. 139. Stems 3–5 in. long, prostrate, dichotomously branched. Leaves green or brown, opposite, ovate, subacute, obscurely 2-dentate; ventral margin arched; dorsal straight, 6–9-toothed at the base, free or connate with that of opposite leaf. Stipules imbricate, transverse, convex, 2-toothed, connate with the leaves below. Perianth campanulate; mouth laciniate, fimbriate.—*Hook. Musc. Exot.* t. 61; *Syn. Hep.* 175.

**Northern** and **Middle Islands**: common in woods, etc., *Menzies*, etc. **Lord Auckland's** group and **Campbell's** Island: *J. D. H.* (Australia, Tasmania.) A very variable plant in size, colour, toothings of the leaves, which are free or connate at their bases.

3. **C. sinuosus**, *Nees*;—*Fl. N. Z.* ii. 141. Stems 3–4 in. long, procumbent. Leaves crowded, brownish-green, opposite, ovate-oblong, obtuse, obscurely 2-toothed at the apex, connate or almost so by their dorsal bases; ventral margin undulate; dorsal very decurrent; involucrel incised. Stipules distant, spreading, 5-partite; segments toothed, connate with the leaves below. Perianth ovate; mouth laciniate, inflexed.—*Syn. Hep.* 175; *Hook. Musc. Exot.* t. 113. *C. oblongifolius*, *Hook. f. and Tayl.* in *Lond. Journ. Bot.* 1845, 563; *Syn. Hep.* 705.

**Northern** and **Middle Islands**: abundant from the Bay of Islands, *J. D. H.*, to Dusky Bay, *Menzies*. **Lord Auckland's** group, *J. D. H.*

† *Leaves strongly 2–5-dentate at the apex.*

4. **C. fissistipus**, *Hook. f. and Tayl. Fl. Antart.* 157. Stems  $\frac{1}{2}$ –1 in. long, procumbent, branched. Leaves ovate, united by their dorsal bases, 2–4-toothed at the apex; ventral margin undulate, 1–2-toothed; dorsal straight; involucrel 2–3-fid; margins toothed and laciniate. Stipules imbricate, reniform, spinulose, connate with the leaves below them. Perianth campanulate; mouth open, laciniate.—*Syn. Hep.* 175 and 704.

**Northern** Island, *Colenso*; Auckland, *Bolton, Sinclair*. **Lord Auckland's** group, *J. D. H.* (Tasmania.)—A handsome, strongly scented species.

5. **C. aculeatus**, *Mitten in Fl. N. Z.* ii. 140. t. 98. f. 4. Stem 1 in. long, creeping. Leaves green, opposite, imbricate, connate by their dorsal bases, ovate; apex 2-toothed, with an obtuse sinus; dorsal margin with 1 spine, ventral with 2 or 3. Stipules transversely oblong, 4-spinous, broadly united with the leaves below them.

**Northern** Island?, creeping over *Hypopterygium concinnum* (*Herb. Mitten*).

\*\* *Dorsal bases of the leaves not connate.*

† *Leaves nearly entire at the apex.*

6. **C. supinus**, *Hook. f. and Tayl. Fl. N. Z.* ii. 142. t. 99. f. 2. Stems

creeping,  $1\frac{1}{2}$  in. long. Leaves brownish-green, imbricate, opposite, membranous, ovate, obtuse or truncate, rarely obscurely toothed; dorsal margin arched, rather recurved; ventral straight. Stipules rather large, suborbicular, 2-dentate with a rounded sinus, spinous-toothed, connate with the leaves below. Perianth campanulate; mouth laciniate, inflexed.—Syn. Hep. 708.

**Northern Island:** Bay of Islands, *Sinclair*; Ruahine range, *Colenso*.—Abnormal leaves are 2-toothed.

7. **C. polycladus**, *Mitten in Fl. N. Z.* ii. 142. *t.* 99. *f.* 3. Very similar in size and appearance to *C. supinus*, but the ventral margin of the leaves is toothed towards the base, and the stipule deeply divided into about 6 spreading laciniae.—*Lophocolea*, Hook. f. and Tayl. in Lond. Journ. Bot. 1846, 367; Syn. Hep. 697.

**Middle Island:** Akaroa, *Raoul*.

8. **C. decipiens**, *Gottsche*;—*Fl. N. Z.* ii. 139. Stems procumbent, branched. Leaves deltoid-ovate; ventral margin arched, inflexed; dorsal bases decurrent, straight, toothed towards the base and free; apex entire; involueral denticulate. Stipules reniform; margins involute, connate with the leaves below. Perianth ovate-oblong, plaited, tips rounded, toothed.—Syn. Hep. 176.

**Northern and Middle Islands:** Tararua, *Colenso*; Dusky Bay, *Menzies*; Port Preservation, *Lyall*.

†† *Leaves 2-4-toothed at the apex.*

9. **C. coalitus**, *Nees*;—*Fl. N. Z.* ii. 141. Stem 1 in. long, creeping. Leaves opposite, ovate-quadrate, truncate, 2-dentate; teeth subulate; involueral small, 2-fid. Stipules 4-6-toothed, connate with the leaves below them. Perianth obovate; mouth 4-toothed.—Hook. Musc. Exot. t. 123; Syn. Hep. 180 and 706.

**Northern and Middle Islands:** from the Bay of Islands, *J. D. H.*, to Dusky Bay, *Menzies*. **Lord Auckland's group**, *J. D. H.* (Tasmania, Java.)

10. **C. Lyallii**, *Mitten in Fl. N. Z.* ii. 140. *t.* 98. *f.* 3. Stems 2-3 in. long, creeping. Leaves green, opposite, imbricate, trapezoid, truncate and 2-dentate at the apex, membranous; dorsal margin entire; ventral spinulose-toothed. Stipules 2-partite; margins toothed, connate with the leaves below them.

**Middle Island:** Port Preservation, *Lyall*, with *C. coalitus*.—A very handsome species.

11. **C. trispinosus**, *Mitten in Fl. N. Z.* ii. 140. *t.* 98. *f.* 5. Stems creeping,  $1-1\frac{1}{2}$  in. long. Leaves pale green, pellucid, nearly opposite, ovate-trapezoid, truncate, 2-toothed, cells large; dorsal margin entire; ventral 1-spinose towards the middle. Stipules short, 2-partite; segments 2- or 3-spinose, narrowly united to the leaves below them.

**Middle Island:** Bligh's Sound, creeping over *C. coalitus*, *Lyall*.—Odour heavy, aromatic.

12. **C. odoratus**, *Mitten in Fl. N. Z.* ii. 140. *t.* 98. *f.* 6. Closely allied in size, habit, and other characters to *C. trispinosus*, but the leaves are



of an olive or brownish-green colour, more deeply 2-toothed at the apex, and stipules 4-spinose. Perianth shortly campanulate; mouth shortly toothed.

**Northern and Middle Islands:** Auckland, *Sinclair*, etc., Port Preservation, *Lyall*.—Odour pungent, peppery.

13. **C. physanthus**, *Mitten in Fl. N. Z.* ii. 141. t. 98. f. 7. Stem 1 in. long, creeping. Leaves lurid or dirty green, subopposite, imbricate, ovate, 2-dentate; sinus obtuse; teeth diverging; involucre 4-toothed. Stipules spinous, 4-toothed, narrowly connate with the leaves below them. Perianth campanulate, rather plaited above; mouth lacinate, inflexed.—Syn. Hep. 700.

**Northern Island:** Bay of Islands, *J. D. H.*; Auckland, *Sinclair*.

§ II. *Leaves alternate. Stipules united by one decurrent margin to a leaf below them.*

14. **C. laxus**, *Mitten in Fl. N. Z.* ii. 142. t. 99. f. 1. Stem 2 in. long, brittle. Leaves bright green, subpellucid, alternate, rather remote, ovate-oblong, unequally 3-4-toothed; cells large, lax. Stipules small, 2-partite; segments 1-toothed.

**Northern Island:** Auckland, *Sinclair*. **Middle Island**, *Lyall*. (Tasmania.)

15. **C. tridentatus**, *Mitten in Fl. Tasman.* ii. 228. t. 179. f. 1.—*C. combinatus*, *Fl. N. Z.* ii. 141. Stems procumbent, slender, 1 in. long. Leaves brownish-green, convex, rigid, shortly oblong or subquadrate, truncate, 2- or 3-toothed at the apex; margins recurved; stipules small, 4-toothed, connate on one side with a leaf below.

**Northern Island:** Bay of Islands, *Cunningham*; Cape Turnagain, *Colenso*; Wellington, *Stephenson*. (Tasmania.)

§ III. *Leaves opposite or alternate. Stipules free.*

16. **C. piperitus**, *Mitten in Fl. N. Z.* ii. 141. t. 98. f. 8. Stem  $\frac{1}{2}$  in. long, creeping. Leaves green or greenish-brown, subopposite, oblong or ovate-oblong, truncate, 2-toothed; sinus shallow. Stipules small, 2-dentate; teeth lanceolate, diverging.

**New Zealand**, *Herb. Mitten*.—A little-known and imperfectly-characterized species. Odour of black pepper.

17. **C. chlorophyllus**, *Mitten in Fl. N. Z.* ii. 139. t. 98. f. 2. Stem  $\frac{1}{2}$  in., creeping. Leaves alternate, pale green or brownish, imbricate, ovate, 2-cuspidate; dorsal margin entire; ventral 1-2-toothed near the apex; involucre similar, denticulate. Stipules free, ovate, 2-dentate, toothed on the sides. Perianth campanulate; mouth open, lobed, and spinous-lacinate.—*Lophocolea*, Hook. f. and Tayl. in *Lond. Journ. Bot.* 1844, 562; Syn. Hep. 698.

**Northern Island:** Bay of Islands, *J. D. H.*; Auckland, *Sinclair*.

18. **C. echinellus**, *Mitten in Fl. N. Z.* ii. 141. Stems small, procumbent. Leaves subimbricate, horizontal, subrotund, spinulose-toothed. Stipules 2-partite; segments lanceolate-subulate, toothed.—*Lophocolea*, Syn. Hep. 703.

**Middle Island:** Dusky Bay, said to have been picked out of specimens of *Plagiochila ramosissima* from Dusky Bay, sent by Dr. Taylor to the authors of the species (*Lindenberg* and *Gottsche*), but this is more than doubtful, as Dr. Taylor had no Dusky Bay mosses.

19. **C. cymbaliferus**, *Hook. f. and Tayl.*—*Jungermannia*, Fl. Antaret. 151. t. 64. f. 5. Stems tufted, 1 in. high, suberect or procumbent, curved. Leaves pale green or yellowish, flaccid, pellucid, densely and closely imbricate, erecto-patent, very concave, subsecund, obliquely orbicular, serrulate; dorsal margin produced into an obovate inflated auricle. Stipules free, very broad, transverse, tumid, closely imbricating, obscurely 3-lobed or quite entire. Perianth lateral, ovate-oblong, tumid below, compressed below the plaited toothed mouth.—Syn. Hep. 711.

**Lord Auckland's** group: roots of old trees in woods, rare, *J. D. H.*—A very peculiar plant. (Tasmania.)

### 9. PSILOCLADA, Mitten.

Hirsute; stems capillary, creeping, subpinnately branched. Leaves succubous, distant, minute, quadrate, 4-cleft. Stipules similar. Fruit lateral, on very short branches. Involucral leaves 2-fid, large, falcate. Perianth subcylindric, smooth; mouth laciniate; laciniae falcate, secund. Calyptra, etc., unknown.

1. **P. clandestina**, *Mitten in Fl. N. Z.* ii. 143. t. 99. f. 4. Stems 1 in. long, capillary, procumbent, sparingly branched. Leaves bright green, microscopic, scarcely broader than the stem, remote, square in outline, consisting of a short horizontal blade and 4 erect subulate lobes at right angles to it; cells large, inflated; involucral, imbricate, large, falcate-secund, more cut. Stipules similar, smaller.

**Northern** Island: Wellington, creeping on mosses, *Stephenson*. (Tasmania.)

A very imperfectly known plant, of which but a few scraps have been found. The only species of the genus.

### 10. ADELANTHUS, Mitten.

Stems erect from a creeping rhizome, branched. Leaves succubous, distichous, vertical, the dorsal margin decurrent. Stipules 0. Fruit terminal on short ventral branchlets, concealed at the bases of the branches. Involucral leaves 3-farious. Perianth tubular, subtrigonus; mouth connivent, toothed. Capsule on a slender fruitstalk. Elaters with 2 spiral fibres. Antheridia in small ventral spikes.

A small genus, consisting of 4 species, found in various parts of the globe. The fructification is very brittle, and hence difficult to examine in a dry state. Dr. Taylor confounded that of an *Aneura* (growing amongst it) with it.

1. **A. falcatus**, *Mitten in Journ. Linn. Soc.* vii. 243.—*Plagiochila*, Fl. N. Z. ii. 131. Stems much branched, 1–3 in. high; branches falcate, incurved, thickened upwards. Leaves dingy-green or brown or black, imbricate, vertical, erect, subopposite, orbicular; dorsal margin subinflexed, quite entire, decurrent; ventral toothed.—*J. falcata*, Hook. Musc. Exot. t. 89. *Plagiochila*, Syn. Hep. 649. *Aulicularia occlusa*, Fl. Antaret. 146. t. 62. f. 8; Syn. Hep. 619.

**Northern** and **Middle** Islands: in bogs, summit of the Tararua and Oparapara mountains, *Colenso*; Dusky Bay, *Menzies*; Port Preservation, *Lyall*. **Campbell's** Island: in bogs, *J. D. H.* (Tasmania.)

## 11. GYMANTHE, Taylor.

Stems prostrate or ascending, vaguely branched. Leaves succubous, distichous. Stipules present or absent. Fruit terminal. Involucre a cylindrical pendulous tube, often fleshy and buried in the ground. Perianth 0 or adnate with the involucre. Capsule on a slender fruitstalk; elaters with 2 spiral fibres. Antheridia free in the axils of the leaves.

A small genus, with one species in the northern temperate zone and several in the southern.

\* *Stipules present, very small.*

1. **G. unguiculata**, *Mitten in Fl. N. Z.* ii. 144. t. 99. f. 6. Stems club-shaped, creeping, with numerous white rootlets, ascending, 1 in. long. Leaves pale green or tinged brown or purple, distichous, densely imbricate, connivent and appressed, suberect, suborbicular or obovate, upper large, obscurely 12-lobed, deeply spinulose-dentate, with 8–10 large teeth; dorsal lobe smaller. Stipules variable, 2–3-fid or palmate.

**Northern** and **Middle** Islands: sulphur springs at Waimata, on a *Dicranum*, *Colenso*. A curious little plant; the stems appear clavate from the closely imbricate leaves being progressively larger upwards. Fruit unknown, but plant very similar to *G. Wilsoni* of Britain.

2. **G. diplophylla**, *Mitten in Fl. Tasm.* ii. 230. t. 179. f. 5. Stems short,  $\frac{1}{2}$ –1 in. long, creeping. Leaves white, pellucid, membranous, cellular, closely imbricate, divaricating, conduplicate, unequally 2-lobed, upper lobe smaller, stipuliform, toothed and ciliate. Stipules 2-fid; segments toothed and ciliate. Perianth terminal, short, cylindric, purple.—*J. diplophylla*, *Fl. Antarct.* 152. t. 64. f. 4. *Gottschea*, *Nees, Syn. Hep.* 624.

**Northern** Island, *Sinclair, Kerr (in Herb. Mitten)*. **Lord Auckland's** group: on tree-ferns, *J. D. H.*

\*\* *Stipules 0.*

† *Leaves quite entire.*

3. **G. Drummondii**, *Mitten in Fl. N. Z.* ii. 144. t. 99. f. 8. Stems  $\frac{1}{2}$  in. long, stout, creeping, rooting at the tips. Leaves greenish-brown, imbricate, spreading, flat, upper larger, ovate, obtuse, quite entire; dorsal margin subrecurved. Involucre as long as the plant, clavate, with scattered rootlets. —*Riccia squamata*, *Tayl. in Drummond's Swan River Mosses*. *Podanthe squamata*, *Tayl. in Hook. Lond. Journ. Bot.* 1846, p. 413; *Syn. Hep.* 789.

**Northern** Island: forests of Titikura, *Colenso*. (Australia and Tasmania.)

†† *Leaves 2-cuspidate, otherwise quite entire.*

4. **G. lophocoleoides**, *Mitten in Fl. N. Z.* ii. 144. t. 99. f. 7. Stem  $1\frac{1}{2}$  in. long, creeping, covered with rootlets below. Leaves pale yellow-green, distichous, spreading, flat, obovate-quadrate or cuneate, 2-lobed at the apex; lobes subulate. Involucre unknown.

**Northern** Island: Tararua mountains, creeping amongst *Plagiochila falcata*, *Colenso*. This quite resembles a *Lophocolea* in habit, and its genus must be very doubtful in the absence of fructification.

††† *Leaves more or less toothed.*

5. **G. setulosa**, *Mitten in Fl. N. Z.* ii. 144. t. 99. f. 5. Stem 1 in.

long, erect from a creeping rhizome, densely setose. Leaves bright yellow-green, spreading, 2-farious, closely imbricate, concave, ovate or obovate, unequally 2-lobed; margins waved and spinulose-toothed all round. Involucre unknown.

**Northern** Island: Tararua mountains, with *Plagiochila falcata*, Colenso.—A very curious plant, but in the absence of fruit a doubtful *Gymnanthe*.

6. **G. saccata**, *Tayl. in Fl. Antarct.* 153. Stems erect from a creeping rhizome, 2–3 in. long, flexuous, fertile incurved. Leaves distant, 3-farious, distichous, ovate-quadrate, flat, decurrent, truncate, emarginate; ventral margin and apex toothed; dorsal subreflexed, entire. Involucre terminal, fleshy.—Hook. Musc. Exot. t. 16. *G. Urvilleana*, *Tayl. in Fl. Antarct.* 153; *Syn. Hep.* 193. *G. tenella*, Hook. f. and *Tayl. Fl. N. Z.* ii. 143; *Syn. Hep.* 192 and 712; *Fl. Tasman.* ii. 229. t. 179. f. 3. *Plagiochila Urvilleana*, *Mont. in Voy. au Pôle Sud*, t. 16. *J. abbreviata*, Hook. f. and *Tayl. in Lond. Journ. Bot.* 1843, 374; *Syn. Hep.* 647 (*Plagiochila*).

Throughout the **Northern** and **Middle** Islands: abundant, from the Bay of Islands, *J. D. H.*, to Dusky Bay, *Menzies*. **Lord Auckland's** group, *J. D. H.* (Tasmania, *Fuegia*).—A common and very variable plant, *G. tenella* seems to be a small state of it.

## 12. SACCOGYNA, Dumont.

Stems procumbent and rooting, vaguely branched. Leaves succubous, distichous, subhorizontal, entire. Stipules entire or toothed. Fruit lateral. Involucre fleshy, pendulous from the under side of the stem, giving off radicles, cylindric. Perianth 0. Calyptra adnate with the involucre, or with the apex free. Capsule on a slender fruitstalk; elaters with 2 spiral fibres. Antheridia in the axils of imbricating minute perigonial leaves on proper branches rising from the axils of the stipules.

This and a single European species, with the habit of *Lophocolea*, are the only known species.

1. **S. australis**, *Mitten in Fl. N. Z.* ii. 145. t. 100. f. 1. Stems 2–3 in. long, creeping. Leaves brownish-green or yellowish, distichous, horizontal, imbricating, obliquely ovate-oblong, 2-toothed at the apex or quite entire. Stipules small, 2-toothed, connate with the leaves below them. Involucre oblong, fleshy, with a few rootlets, crowned with a few small toothed leaves.

**Northern** Island: forests of Tararua, Colenso.

## 13. LEPIDOZIA, Nees.

Stems creeping, often very minute and slender, throwing out rootlets from the ventral surface. Leaves incubous, obscurely distichous, 4-toothed or 4-cleft. Stipules present. Fruit terminal (and antheridia) on proper branches from the under side of the stem. Involucral leaves numerous, short, broad, toothed. Perianth elongate, 3-angled, the faces hollow; mouth toothed. Calyptra membranous. Capsule on slender fruitstalks, globose; elaters with 2 spiral fibres. Antheridia solitary in the bases of conduplicate 2–3-cleft perigonial leaves.



A large genus, of very minute-leaved plants, often themselves minute and almost microscopic. The species are in many cases very badly defined, and I suspect that not a few of the following may be united hercafter. Very few species indeed inhabit the N. temperate zone. The larger resemble *Sendtnera* in general appearance.

§ 1. *Leaves 3-5-fid, but not toothed nor serrate.*

\* *Stems flexuose, wiry, 1-4 in. long, much pinnately or 2-pinnately branched; branches decurved, attenuated.*

1. **L. microphylla**, *Lindb.*;—*Fl. N. Z.* ii. 145. Stems 1-2 in. long, pinnately branched; branches pendulous with capillary tips. Leaves minute, distant, appressed, palmately 4-partite; involucre oblong-ovate, 2-4-fid. Stipules quadrate, flat, deeply 4-fid. Perianth cylindric, attenuate, incurved, obsoletely toothed.—*Hook. Musc. Exot.* t. 80; *Syn. Hep.* 202.

**Middle Island:** Dusky Bay, *Menzies*; Otago, *Hector*; Port Preservation, *Lyall*; Otago, *Hector and Buchanan*. (Tasmania.)

2. **L. capilligera**, *Lindb.*;—*Fl. N. Z.* ii. 145. Stems 1 in. long, erect, simply pinnate; branches with capillary tips. Leaves olive-brown, subimbricate,  $\frac{1}{2}$  vertical or horizontal, and stipules obovate-quadrate or cuneate, 4-fid to the middle; lobes divaricate, subulate. Fruit unknown.—*L. tetrapila*, *Tayl. in Lond. Journ. Bot.* 1846, 370; *Syn. Hep.* 716.

**Northern and Middle Islands:** Tararua, with *Saccogyna australis*, *Colenso*; Otago, *Hector and Buchanan*. (Tasmania.)

3. **L. prænitens**, *Lehm. and Lindb.*;—*Fl. N. Z.* ii. 145. Stems procumbent, alternately 2-pinnate. Leaves subimbricate,  $\frac{1}{2}$ -vertical, obovate-cuneate, 4-fid; segments lanceolate. Stipules patent, transversely quadrate, 4-partite; lobes divaricate. Perianth subsessile, curved; mouth sub-4-toothed.—*Syn. Hep.* 206.

**Northern and Middle Islands:** Auckland, *Sinclair*; Wellington, *Stephenson*; Tararua, *Colenso*; Dusky Bay, *Menzies*. **Lord Auckland's** group, *J. D. H.* (Tasmania.)

4. **L. Gottscheana**, *Lindb.*;—*Fl. N. Z.* ii. 145. Stems procumbent, irregularly subpinnately branched. Leaves approximate, subhorizontal, flat, obcuneate or quadrate, 4-fid; lobes subulate. Stipules remote, 4-partite. Perianth as in *L. prænitens*.—*Syn. Hep.* 206.

**Middle Island:** Dusky Bay, *Menzies*. (Tasmania.)—This and the two preceding seem not essentially different.

5. **L. lævifolia**, *Hook. f. and Tayl. Fl. Antart.* 157;—*Fl. N. Z.* ii. 146. Stems 1-2 in. long, excessively pinnately branched; branches deflexed. Leaves yellow or olive-brown, subvertical, rather close-set, subimbricate on the branches, ovate-cordate, 3-5-fid; lobes flat or incurved; involucre small. Stipules distant, spreading, ovate, cordate or orbicular, 4-fid. Perianth as in *L. prænitens*.—*Syn. Hep.* 208.

**Northern Island:** probably common, Wellington, *Stephenson*; Port Nicholson, *Lyall*. *Tehawera*, *Colenso*. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (Tasmania.)

6. **L. pendulina**, *Lindb.*;—*Fl. N. Z.* ii. 146. Stem 2-3 in. long, erect, 2-pinnate; branches pendulous, fascicled; tips capillary. Leaves imbricate,

subvertical, obliquely secund, and stipules orbicular-ovate, convex, deeply 4-fid; segments lanceolate, conniving, somewhat waved.—Syn. Hep. 208.

**Northern and Middle Islands:** top of the Ruahine range, *Colenso*; Dusky Bay, *Menzies*; Caunterbury, *Haast*; Otago, *Hector and Buchanan*. (Tasmania.)

7. ***L. spinosissima***, *Mitten in Fl. N. Z.* ii. 146. *t.* 100. *f.* 2. Stems 3 in. long, 2-pinnate; branches fastigate, capillary at the ends. Leaves pale-brown, erecto-patent, distant, and stipules flat, cuneate or oblong-quadrate, 4-fid below the middle; segments subulate, rigid.—*Sendtnera*, Hook. f. and Tayl. in Lond. Journ. Bot. 1846, 373; Syn. Hep. 723.

**Northern Island:** common, *Edgerley*, *Colenso*, etc.

8. ***L. filamentosa***, *Lindb.*;—*Syn. Hep.* 207. Stems suberect, pinnate; branches with capillary tips. Leaves remote,  $\frac{1}{2}$ -vertical, decurrent, convex, orbicular, 3-4-fid; lobes broadly lanceolate, with incurved tips; involucre oblong, incised and toothed. Stipules ovate-quadrate, 3-4-fid. Perianth cylindric-pyriform; mouth toothed.—*Mont. Voy. au Pôle Sud*, 246.

**Lord Auckland's group**, *D'Urville*. A N.W. American and Fuegian plant, of which I have seen no N. Z. specimens.

*\*\* Stems usually less than 1 in. long, capillary, vaguely branched.*

9. ***L. dispar***, *Mont. Voy. au Pôle Sud*, 248;—*Fl. Antarct.* 158. Stem capillary, minute,  $\frac{1}{2}$  in. long, tufted; branches very long, capillary, spreading. Leaves vertical, distant, spreading, incurved, obovate-cuneate, narrow at the base, 3-fid to the middle; segments subulate subacute. Stipules similar, smaller. Perianth terminal, capitate, large.—*Syn. Hep.* 203.

**Lord Auckland's group and Campbell's Island**, *Hombron, J. D. H.*

10. ***L. patentissima***, *Hook. f. and Tayl. Fl. Antarct.* i. 158. *t.* 65. *f.* 5. Stem minute, short, slender,  $\frac{1}{2}$  in. long, creeping, tufted, subpinnately branched; branches short. Leaves olive-green, imbricate, rather close-set, obliquely spreading, cellular, obovate-quadrate, narrowed at the base, 3-5-fid; segments shortly ovate-subulate, straight or incurved. Stipules similar, minute.—*Syn. Hep.* 204.

**Lord Auckland's group:** creeping on trunks of trees, etc., *J. D. H.*

11. ***L. Lindenbergii***, *Gottsche*;—*Fl. N. Z.* ii. 146. Stem creeping, 1-2-pinnately branched; branches crowded, spreading. Leaves pale yellow-green, distant, distichous, subvertical, spreading, obovate-quadrate; segments capillary, articulate, straight and incurved; involucre unequally divided. Stipules orbicular-ovate, 3-5-parted. Perianth cylindric, elongate; mouth contracted, ciliate.—*Syn. Hep.* 213.

**Northern and Middle Islands:** probably common, from the Bay of Islands, *J. D. H.*, to Dusky Bay, *Menzies*.—This is the plant alluded to in *Fl. Antarct.* 158, under *L. tetradactyla*, as from New Zealand. (Tasmania.)

12. ***L. capillaris***, *Lindb.*;—*Fl. N. Z.* ii. 146. Stems  $\frac{1}{2}$  in. long, creeping, capillary, pinnately branched or decompound; branches diverging. Leaves vertical, subimbricate, obovate-quadrate, and minute stipules 3-4-partite; segments lanceolate, subulate, incurved, obtuse; involucre shortly incised, ciliate; margins toothed. Perianth with the mouth ciliate.—*Syn.*

Hep. 212. *L. hippuroides*, Hook. f. and Tayl. Fl. Antarct. 159. t. 65. f. 7, and *I. nemoides*, Tayl. in Hook. Lond. Journ. Bot. 1845, p. 84.

**Northern Island**, Bay of Islands, *Sinclair*. **Lord Auckland's group**: on bark, etc., *J. D. H.*—A common tropical and southern plant, first described from West Indian specimens. (Jamaica, S. Africa, Tasmania, etc.)

13. ***L. plumulosa***, *Lehm. and Lindb.*—*L. tetradactyla*, Hook. f. and Tayl. Fl. Antarct. 158. Stems 1 in. long, procumbent, pinnately decom-pound; branches subequal, narrowing towards their tips. Leaves close-set, subvertical, quadrate-obovate, deeply 3-6-fid; segments subulate. Stipules quadrate, spreading at the base, acutely 4-fid. Perianth cylindric; mouth contracted, toothed.—Syn. Hep. 211.

**Lord Auckland's group**: on bark, etc. *J. D. H.* (Fuegia.)—This was confounded in Fl. Antarct. with the *L. Lindenberghii*, which has a ciliate mouth to the perianth.

§ 2. *Leaves 3-5-fid and also toothed.*

14. ***L. tenax***, *Lindb.*;—*Fl. Antarct.* 158. Stems pinnately compound or decom-pound; branches incurved; tips convolute. Leaves imbricate, vertical, ovate, concave, cauline appressed, 8-partite, sides lacerate and ciliate, those of the branches spreading, 3-4-fid; segments subulate. Stipules ovate, flat, 4-5-parted, ciliate and lacerate at the base.—Greville in Annals of New York Lyceum, i. 277. t. 23; Syn. Hep. 212.

**Lord Auckland's group**: on the ground and on trunks of trees, *J. D. H.* (Australia.)

15. ***L. albula***, *Hook. f. and Tayl. Fl. Antarct.* 159. t. 65. f. 6. Stems  $\frac{1}{2}$ -1 in. long, procumbent, subpinnately branched; branches decurved, narrowed to the tips. Leaves yellow or greenish-white, pellucid, densely imbricate, very broad, amplexicaul, spreading, very concave, cellular, obliquely-oblong, 4-fid and deeply incised all round; dorsal margin dilated; laciniae entire or 2-fid, incurved. Stipules large, orbicular, concave, irregularly deeply 6-8-toothed.—Syn. Hep. 211.

**Lord Auckland's group**: creeping over other *Hepaticæ*, *J. D. H.*—Very much more beautiful and stouter than the other species, of a different habit and texture, but, owing to the absence of fruit, doubtful as to genus.

#### 14. MASTIGOBRYUM, Nees.

Stems creeping and rooting or ascending, large, sparingly branched, giving off numerous filiform leafless shoots. Leaves distichous, incubous, usually 3-fid at the apex. Stipules toothed, often connate with the leaves above them. Fruit (and antheridia) terminal, on short proper branches, arising from the bracts of the stipules. Involucral leaves small, narrow, incised at the apex. Perianth elongate, 3-angular; mouth 3-toothed. Calyptra membranous. Capsule globose, on a slender fruitstalk; elaters with 2 spiral fibres. Antheridia 2 in the axil of each perigonial leaf.

A tropical and subtropical genus, rare in Europe and N. America, most abundant in Australia and New Zealand. The species are often broad and flat, some resembling *Lophocoleæ* in general habit, but the stipules are connate with the leaves above (not below) them.

§ 1. *Stipules quite free from the leaves.*

\* *Leaves quite entire.*

1. **M. convexum**, *Lindb.*;—*Fl. N. Z.* i. 147. Small; stems procumbent, flexuous, subdichotomous; branches narrowed to the tips. Leaves imbricate at their bases,  $\frac{1}{2}$ -vertical, ovate, retuse, entire or obscurely 3-dentate. Stipules remote, free, ovate, 4-fid; segments acute, incurved. Perianth ovate, incurved; mouth plaited, toothed.—*Syn. Hep.* 215.

**Northern Island**: Tararua mountains, *Colenso*. (S. Africa, Australia, Peru, Mauritius.)

2. **M. tenacifolium**, *Hook. f. and Tayl. Fl. Antarct.* 152. t. 64. f. 6. Stems 1–1½ in. long, suberect, slender, stiff, rigid, flexuous. Leaves purple-brown or black, opaque, distant, spreading, rigid, elliptical-oblong, obtuse, quite entire, concave. Stipules smaller, entire or 2-fid.—*Syn. Hep.* 687.

**Lord Auckland's** group: on rocks near the hilltops.—*Mitten* (*Fl. N. Z.* ii. 147) confidently refers this to the genus *Mastigobryum*; the fruit is unknown. (Fuegia.)

\*\* *Leaves 2-dentate or 2-fid.*

3. **M. anisostomum**, *Lehm. and Lindb.*;—*Fl. N. Z.* ii. 146. Stems 1–2 in. long, suberect or creeping, dichotomous; branches decurved. Leaves olive-brown, opaque, horizontal or  $\frac{1}{2}$ -vertical, lax or closely imbricate, concave, deflexed; those of the branches subsecund, triangular-ovate, unequally 2-dentate. Stipules minute, orbicular, 3-fid. Perianth cylindric; mouth 4-toothed.—*Syn. Hep.* 219. *M. atro-virens*, *Hook. f. and Tayl. Fl. Antarct.* 160; *Syn. Hep.* 218.

**Middle Island**: Dusky Bay, *Menzies*; Port Preservation, *Lyall*. **Lord Auckland's** group: creeping amongst mosses, *J. D. H.*

4. **M. Colensoanum**, *Mitten in Fl. N. Z.* ii. 147. t. 100. f. 3. Small; stem 1 in. long, procumbent, dichotomous, stoloniferous. Leaves pale green, membranous, spreading, flat, imbricate, oblong, 2-dentate, smaller tooth on the ventral side; sinus acute; dorsal margin arched, ventral straight. Stipules appressed, minute, 3-toothed.

**Northern Island**: Tararua, with *Saccogyna australis*, *Colenso*. (Australia, Tasmania.)

\*\*\* *Leaves 3-dentate.*

5. **M. Taylorianum**, *Mitten*;—*Fl. N. Z.* ii. 147. t. 100. f. 5. Small; stems  $\frac{1}{2}$ –1 in. long, creeping, dichotomous. Leaves pale green, laxly imbricate, spreading, flat, obliquely oblong-quadrate, 3-dentate; dorsal margin arched, ventral straight, with a band of large translucent cells. Stipules small, orbicular, 4-toothed.

**Northern Island**: forests of Tehawera, *Colenso*.

6. **M. monilinerve**, *Nees*;—*Fl. N. Z.* ii. 148. Stem procumbent, dichotomous. Leaves approximate,  $\frac{1}{2}$ -vertical, spreading, convex, obliquely oblong, 3-dentate; ventral margin with a band of large translucent cells. Stipules close-set, orbicular-ovate, crenulate. Perianth plicate above; mouth toothed.—*Syn. Hep.* 223.

**Stewart's** Island: on *Plagiochila annotina*, *Lyall*. (Australia, Tasmania.)



§ 2. *Stipules connate on both sides with the leaves above them.*

7. **M. novæ-Hollandiæ**, *Nees*;—*Fl. N. Z.* ii. 148. Stems 2–3 in. long, procumbent, dichotomous; branches equal, often recurved. Leaves imbricate, divergent, flat or convex, ovate-oblong, subfalcate, unequally serrulate, erose or dentate at the apex; involucrel appressed, inciso-serrate. Stipules close-set, orbicular-quadrangle, dentate or multifid, usually connate with the leaves above them. Perianth cylindric-ovate, narrowed upwards and plaited; mouth dentate.—*Syn. Hep.* 221. *M. adnexum*, *Lehm.* and *Lindb.*; *Mont. Voy. au Pôle Sud*, 243.

Common throughout the **Northern** and **Middle** Islands, and in **Lord Auckland's** group.—A common and very variable plant in the Southern Hemisphere.

8. **M. novæ-Zelandiæ**, *Mitten in Fl. N. Z.* ii. 148. t. 100. f. 6. Large; stems 2–3 in. long, procumbent, dichotomous, with long stout radicles below. Leaves olive-brown or -green, subopposite, distichous, spreading and deflexed, imbricate, obliquely ovate, 3-dentate; dorsal margin arched, ventral sinuate; stipules quadrate, spreading, crenulate, united to the leaves above them.

**Northern** and **Middle** Islands: forests of Tehawera and Tararua, *Colenso*; Auckland, *Sinclair*; Canterbury, *Haast*.—A noble species.

9. **M. involutum**, *Lindb.*;—*Fl. N. Z.* ii. 148. Large; stems 2–3 in. long, forked; branches dense. Leaves densely imbricate, diverging and deflexed, obliquely oblong, concave; apex 3-dentate, incurved or involute. Stipules suborbicular, repand; apex crenate, reflexed, connate with the leaves above them.—*Syn. Hep.* 221; *Montagne in Voy. au Pôle Sud*, t. 18. f. 2. *Herpetium*, *Montagne*, *Cent. iv. n. 30*.

**Middle** Island: Milford Sound, *Lyall*; Otago, *Hector and Buchanan*. **Lord Auckland's** group, *Hombrook, J. D. H.* (Tasmania.)

10. **M. affine**, *Mitten in Fl. N. Z.* ii. 147. t. 100. f. 4. Stem 1 in. long, dichotomously branched, creeping, sending down long rootlets. Leaves dirty green, imbricate, spreading, flat, obliquely ovate, obliquely truncate, 3-crenate or -toothed; dorsal margin arched, ventral straight. Stipules transversely oblong, toothed and spinescent, connate with the leaves above.

**Northern** Island: forests of Tararua and Tehawera, *Colenso*.

11. **M. decrescens**, *Lehm. and Lindb.* Stem  $\frac{1}{2}$ –1 in. long, creeping, branched, narrowed at the apex. Leaves imbricate,  $\frac{1}{2}$ -ovate; dorsal margin subundulate, ventral margin decurrent, connate with the stipule; apex truncate, 3-toothed; teeth crenulate. Stipule reniform, spreading, quite entire. Perianth cylindric-ovate; apex narrow, plaited; mouth toothed.—*Syn. Hep.* 219; *Mont. Voy. au Pôle Sud*, 243. t. 19. f. 4 (*Herpetium*).

**Lord Auckland's** group, *Hombrook*.—I have seen no New Zealand specimens of this, the description of which is taken from the 'Synopsis Hepaticarum.' (*Mauritius*.)

## 15. MICROPTERYGIUM, Lindenberg.

Stems creeping, with ascending flat branches, incurved or involute apices, and flagelli from the under surface. Leaves incubous, imbricate, complicate,

keeled in the American but not in the only N. Z. species. Stipules entire or 2-4-fid. Fruits terminal on short lateral branches. Involucral leaves elongate, ciliate. Perianth long, membranous, triquetrous; mouth laciniate. Calyptra slender, membranous, included. Capsule on a slender fruitstalk; elaters with 2 spiral fibres. Antheridia as in *Mastigobryum*?

A small genus of temperate and tropical American species.

1. **M. nutans**, *Mitten in Fl. N. Z.* ii. 148. Stem 1 in. high, stout, tufted, erect from a creeping rhizome, thickened upwards, succulent, nearly simple; tips incurved or nodding. Leaves pale green or whitish, cellular, spreading, densely imbricate, concave, broadly ovate, unequally 2-fid, subentire; segments incurved, lower smaller. Stipules erect, broadly ovate, 2-fid or -toothed. Perianth lateral, large, lanceolate, trigonous above.—*Mastigobryum*, *Fl. Antaret.* 160. t. 65. f. 8; *Syn. Hep.* 219 and 717.

**Northern** Island: forests of Titiokura, *Colenso*. **Lord Auckland's** group: wet places, at the roots of trees, etc., *J. D. H.*—Mitten observes that the 2-fid leaves and absence of a keel are against its association with the American species, but its habit, etc., is similar, and widely different from that of *Mastigobryum*.

## 16. ISOTACHIS, Mitten.

Stem erect, branching with innovations, almost trifarious. Leaves incubous, imbricating, conduplicate, serrulate. Stipules nearly as large. Fruit terminal. Involucral leaves, inner minute, outer like the cauline. Perianth erect, tubular, fleshy, rigid; mouth contracted, toothed.

A southern genus, of which its author says it may be recognized by its evenly arranged leaves and stipules, the latter so closely resembling leaves that the leaves may almost be called trifarious. It resembles *Sendtnera* in habit, but differs in the form of the perianth and free calyptra.

1. **I. Lyallii**, *Mitten in Fl. N. Z.* ii. 149. t. 100. f. 7. Stem 2-4 in. high, erect; branches decurved at the tips. Leaves pale brown and purple, imbricate, subquadrate or  $\frac{1}{2}$ -cordate, truncate; dorsal margin arched, toothed at the apex; ventral spinulose; segments toothed, recurved. Stipules obovate, 3-4-fid. Perianth subcylindric, obtuse, papillose.

**Northern** and **Middle** Islands: top of the Ruahine range, *Colenso*; Port Preservation, *Lyall*.—A tall and handsome plant.

2. **I. subtrifida**, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1844, 579;—*Fl. N. Z.* ii. 149. Stem 1 in. high, slender, simple; tips decurved. Leaves pale brown, upper rosy, loosely imbricate, secund, erecto-patent, ovate, conduplicate, 2-3-fid; teeth and dorsal margin entire; ventral entire or toothed. Stipules similar, smaller.—*Syn. Hep.* 681; *Fl. Tasman.* t. 179. f. 7.

**Northern** Island: Bay of Islands, *J. D. H.* (Tasmania.)

3. **I. intortifolia**, *Hook. f. and Tayl. Fl. Antaret.* 150. t. 64. f. 1. Stems  $1\frac{1}{2}$ -2 in. high, erect, flaccid, sparingly branched. Leaves purplish, spreading, imbricate, flaccid, cellular, very concave, ventricose, amplexicaul, orbicular oblong, unequally 2-4-fid, rarely entire; segments acuminate, incurved, toothed. Stipules imbricate, large, orbicular, very concave, emarginate 2-fid or toothed, membranous.—*Fl. Tasman.* ii. 233.

**Campbell's** Island: bogs on the hills, *J. D. H.* (Tasmania.)

## 17. TRICHOCOLEA, Nees.

Stems erect or inclined, tufted, much branched, very soft, white and woolly to appearance. Leaves incubous and distichous, but clothing the stem, deeply palmately divided, the lobes laciniated. Stipules present. Fruit in the forks of branches. Involucral leaves many, connate into a hairy tube, which is adnate with the calyptra, coriaceous; mouth truncate. Perianth 0. Capsule oblong, on a slender fruitstalk; elaters with 2 spiral fibres. Antheridia in the axils of leaves on the upper side of the stem.

A small genus of very beautiful pale *Hepaticæ*, with the leaves so much ciliate and cut as to give the whole stem a woolly appearance.

1. **T. tomentella**, Nees;—*Fl. N. Z.* ii. 153. Stems 2–5 in. long, 3-pinnate. Leaves white, 2-partite; segments capillary, multifid; ventral lobe smaller, inclined forwards. Stipules subquadrate, 4-partite, capillaceo-multifid.—*Syn. Hep.* 237. *T. mollissima*, *Fl. Antarct.* 161; *Syn. Hep.* 237. *T. tomentella*,  $\gamma$  *javanica*, *Syn. Hep.* 721.

Throughout the **Northern** and **Middle** Islands, abundant in damp woods, also in **Lord Auckland's** group and **Campbell's** Island. (Tasmania, India, Europe, and America.)

2. **T. lanata**, Nees;—*Fl. N. Z.* ii. 153. Stem 2–3 in. long, distantly simply pinnate. Leaves with the dorsal lobe incised, ciliate and laciniate. Stipules 4-fid to the middle only; segments capillaceo-multifid.—*Syn. Hep.* 238; *Hook. Musc. Exot.* t. 116.

Abundant throughout the **Northern** and **Middle** Islands, *Menzies*, etc.

3. **T. polyacantha**, *Hook. f. and Tayl. Fl. Antarct.* i. 161. t. 65. f. 9. Minute; stems  $\frac{1}{2}$  in. long, very slender, capillary, sparingly branched. Leaves very minute, brittle, olive-green, loosely imbricate, spreading, and 4-fid; segments multifid, setaceous, articulate, cellular. Perianth terminal, large, erect, subclavate, hispid, 4-toothed. Fruitstalk very long.—*Syn. Hep.* 239.

**Lord Auckland's** group: in woods near the sea, *J. D. H.*—A very doubtful *Trichocolea*, perhaps a *Lepidozia*.

## 18. SENDTNERA, Endlicher.

Stems erect or inclined, tufted, pinnately branched; branches often recurved, attenuated. Leaves obscurely distichous, incubous, closely imbricate, 2–5-cleft, segments entire. Stipules 2- or many-cleft. Fruit terminal on long branches, or lateral, subsessile. Involucral leaves numerous, incised, connate with the perianth. Perianth tubular, deeply cleft, membranous at the base. Calyptra chartaceous. Capsule globose, on a short fruitstalk; elaters free, with 2 spiral fibres. Antheridia in the axils of tumid perigonal leaves, on proper branches.

A small genus, scattered over various parts of the world.

I. SCHISMA, *Dumont.*—Fruit terminal on long branches.

1. **S. juniperina**, Nees;—*Fl. N. Z.* ii. 153. Stems 3–5 in. long, suberect, slender. Leaves pale brown, and stipules oblong, 2-fid, with an

obtuse sinus; segments lanceolate, acuminate, straight or slightly diverging.—Syn. Hep. 239; Hook. Brit. Jungerm. t. 4 et Suppl. t. 1.

**Northern** Island: top of the Ruahine range with *J. colorata*, *Colenso*. (Tasmania, India, Europe, etc.)

2. ***S. attenuata***, *Mitten in Fl. N. Z.* ii. 153. *t.* 102. *f.* 2. Stems 3 in. long, pinnately branched; branches decurved, attenuated, flagelliform. Leaves pale yellow-brown, ovate, 2-fid; segments 2-partite, with subulate lobes, ventral margin entire, dorsal spinulose-toothed. Stipules similar, but deeper cut, toothed at the base. Fruit terminal. Involucre ovate, covered with leafy scales.

**Northern** Island: Bay of Islands, *J. D. H.*

3. ***S. ochroleuca***, *Nees*;—*Fl. N. Z.* ii. 153. Stems variable in size, slender, creeping or ascending. Leaves and stipules ochreous-yellow, 3–5-fid, ciliate at the base; segments of the stipules channelled or flat. Perianth campanulate, covered with foliaceous scales.—Syn. Hep. 240. *J. hirsuta*, *Nees*; *Fl. Antarct.* 160 and 443.

**Middle** Island: Milford Sound and Port Preservation, *Lyall*. **Campbell's** Island, *J. D. H.*; Otago, *Hector and Buchanan*. (Fuegia, India, S. Africa, Mexico.)

## II. MASTIGOPHORA.—Fruit on short lateral branches or almost sessile.

4. ***S. scolopendra***, *Nees*;—*Fl. N. Z.* ii. 153. Stem 3–5 in. long, erect, pinnate; branches deflexed, attenuated to the tips, flagelliform, naked, often rooting. Leaves and stipules closely imbricate, scarious, rigid, oblong, 2-fid; segments diverging, again 2-fid, acuminate, diaphanous. Perianth in the axils of lateral branches, obovate, 4-fid, covered with imbricating leaves.—Hook. Musc. Exot. t. 40; *Fl. Antarct.* p. 160. *Schisma*, *Nees*, etc.

**Middle** Island: Dusky Bay, *Menzies*. **Lord Auckland's** group and **Campbell's** Island: abundant on the hills, *J. D. H.* (Tasmania.)

5. ***S. flagellifera***, *Nees*;—*Fl. N. Z.* ii. 153. Stems 2–3 in. long, erect, pinnately branched; branches attenuate, flagelliform. Leaves greenish-brown, 2-farious, horizontal, unequally 2-fid; lobes conduplicate; dorsal larger, acute, often slightly toothed; ventral more lanceolate, entire or 2-fid. Stipules ovate, 2-partite, rarely 4-fid, toothed at the base.—Syn. Hep. 242; Hook. Musc. Exot. t. 59.

**Northern** and **Middle** Islands: common, from Bay of Islands, *Cunningham*, etc., to Dusky Bay, *Menzies*. (Tasmania.)

## 19. POLYOTUS, Gottsche.

Stems prostrate, pinnately branched. Leaves incubous, closely imbricate, auricled, the auricle often spinous, with a lamina of various shape between it and the blade of the leaf. Stipules usually 4-fid, the middle lobes clavate. Fruit lateral or axillary. Involucre of many confluent leaves. Perianth 0. Calyptra confluent with the involucre, its apex free, bearing sterile pistils near the apex. Capsule oblong, on short fruitstalk; elaters with 2 spiral fibres. Antheridia solitary in the axils of terminal perigonial leaves.

A small Australian, New Zealand, and Antarctic genus, not found in the northern hemispheres.



1. **P. claviger**, *Gottsche*;—*Fl. N. Z.* ii. 152. Stem creeping, 3–4 in. long, 2-pinnately branched. Leaves yellow-brown, closely imbricate, plane or convex, ovate-cordate, acute or apiculate, quite entire or more or less toothed; auricles clavate, with a large triangular lamina. Stipules 4-partite; segments with revolute margins, entire or toothed, 2 intermediate often saccate. Involucre cylindric-ovoid, rough with the adnate involucreal leaves.—*Syn. Hep.* 215; *Hook. Musc. Exot.* t. 70.

Var. *α*. Leaves quite entire.

Var. *β*. *Stangeri*. Leaves of the branches toothed.

Var. *γ*. *Taylori*. Cauline leaves toothed and spinous on the ventral margin.—*P. Taylori*, *Syn. Hep.* 246.

**Northern and Middle Islands**: common from Auckland, *Sinclair*, to Dusky Bay, *Menzies*. **Campbell's Island**: on alpine rocks, *J. D. H.* (Tasmania).—A very variable plant.

2. **P. palpebrifolius**, *Gottsche*;—*Fl. N. Z.* ii. 246. Stems 4–6 in. long, creeping, flexuose, 1–2-pinnate. Leaves brown, closely imbricate, ovate, spinous-ciliate; auricle club-shaped, split, with a spine above the fork, and interposed lamina ciliate and variable in form and lobing. Stipules 4-partite, ciliate, intermediate lobes on the branches saccate. Involucre axillary, with ciliated leaflets.—*Syn. Hep.* 246; *Hook. Musc. Exot.* t. 71.

**Middle Island**: Dusky Bay, *Menzies*; Thomson's Sound, *Lyall*. (Fuegia.)

3. **P. brachycladus**, *Gottsche*;—*Fl. N. Z.* ii. 152. Stem 3–4 in. long, 2-pinnate; branches very short. Leaves dark purple-brown, orbicular-cordate or broadly ovate, ciliate; auricles club-shaped, with no spine, saccate, purple, rarely flat and ciliate. Cauline stipules 4-partite, segments entire toothed or cut, those of the branches with 2 intermediate auricles. Involucre conical, coriaceous, leafy; leaflets spinous-ciliate.—*Syn. Hep.* 247; *Fl. Tasm.* ii. 234. t. 180. f. 2.

**Northern Island**: top of the Ruahine mountains, *Colenso*. (Tasmania.)

4. **P. Magellanicus**, *Gottsche*;—*Fl. N. Z.* ii. 153. Stem creeping, 3-pinnate. Leaves brown-purple, imbricate, ovate-orbicular, spinous-ciliate; cauline auricles variable, clavate, saccate, setigerous or plane, with lacinate segments; laminæ larger, 3-angular, sometimes subcucullate. Cauline stipules orbicular-ovate, 2-fid, entire or ciliate, those on the branches 2-fid lacerate or clavate. Involucre very large; leaves convolute, ciliate.—*Syn. Hep.* 248; *Hook. Musc. Exot.* t. 115.

**Northern and Middle Islands**: forests, Wairarapa river, *Colenso*; Chalky Bay, *Lyall*. **Campbell's Island**: on alpine rocks, *J. D. H.* (Fuegia, Tasmania, Australia.)

## 20. RADULA, Nees.

Stems erect or creeping, pinnately branched. Leaves distichous, incubous, 2-lobed; ventral lobe small, inflexed, rooting at the base. Stipules 0. Inflorescence monœcious. Fruit in the fork or apex of short branches. Involucreal leaves 2, 2-lobed. Perianth terete or compressed; mouth dilated. Calyptra pyriform, persistent, bursting below the apex. Capsule on a short

fruitstalk, ovoid; elaters with 2 spiral fibres; spores large. Antheridia in the inflated bases of perigonal leaves.

A considerable genus, found in all parts of the world.

1. **R. buccinifera**, *Hook. f. and Tayl. Fl. N. Z.* ii. 154. Stem 1 in. long, prostrate, pinnate. Leaves yellow-green or brown, subimbricate, spreading, rounded at the apex, upper lobe obovate-orbicular, convex, its apex incurved, lower minute, trapezoid, appressed. Perianth at length axillary, very long, subcylindric, compressed above; mouth dilated, quite entire.—*Syn. Hep.* 261.

**Northern and Middle Islands**: common in forests on the mountains, *Colenso*, etc.; *Otago, Hector and Buchanan*. (*Tasmania*.)

2. **R. physoloba**, *Mont.*;—*Fl. N. Z.* ii. 154. Stem procumbent, rigid, flexuous, much pinnately branched. Leaves yellow-green or brown, subvertical, orbicular, convex, quite entire; apex inflexed; lobule large, inflated below the apex, retuse or emarginate. Perianth terminal or axillary, long, cochleariform, truncate.—*Syn. Hep.* 254; *Mont. Voy. au Pôle Sud*, 256. t. 17. f. 4. *L. aquilegia*, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1846, 291.

**Northern Island**: forests of the Manawata, *Colenso*. **Lord Auckland's group**, *Hombroon*. (*Tasmania*.)

3. **R. uvifera**, *Hook. f. and Tayl. Fl. Antaret.* 162;—*Fl. N. Z.* ii. 154. Stem 1–2 in. long, stout, much branched. Leaves olive-brown or purplish, imbricate, convex, tumid, obovate-orbicular, quite entire; upper lobe larger, convex, broadly oblong-orbicular; apex recurved; lower ovate-oblong, obtuse, tumid below, its apex appressed to the upper. Perianth obovate-oblong, much compressed, subcochleariform, 4–5-costate below; margins subulate; mouth truncate, entire.—*Syn. Hep.* 258, 729. *R. multicarinata*, *Syn. Hep.* 258.

**Northern Island**: in mountainous districts, common, *Colenso*, etc. **Lord Auckland's group**: abundant on bark of trees, *J. D. H.*

4. **R. plicata**, *Mitten in Fl. N. Z.* ii. 154. Stem 1 in. long, slender, procumbent, pinnate. Leaves imbricate, orbicular-obovate, as in *R. buccinifera*. Perianth linear-elongate, flattened, with 3 keels or ribs on the ventral side, and 2 on the dorsal; mouth truncate, quite entire.

**Northern Island**: Auckland, with *R. buccinifera*, *Sinclair*. Closely allied to *R. buccinifera*, but larger and with a very different perianth.

5. **R. complanata**, *Dumortier*;—*Fl. N. Z.* ii. 155. Stem 1–2 in. long, flattened, creeping, subpinnate. Leaves pale greenish-brown, distichous, closely imbricate; upper lobe orbicular, almost flat, quite entire; lower lobe  $\frac{1}{4}$  smaller, appressed with a rounded angle. Perianth flattened, oblong, truncate.—*Hook. Brit. Jungerm.* t. 81; *Syn. Hep.* 257.

**Northern Island**: Rankawa, on trunks of trees, *Colenso*. **Campbell's Island**, *J. D. H.*—The Rankawa plant is a small form, without fruit, bearing buds on the edges of the leaves, as is common in Europe. (A very common plant in Europe, America, S. Africa, and India.)

6. **R. marginata**, *Hook. f. and Tayl. Fl. N. Z.* ii. 154. Stems flattened,

1-3 in. long, vaguely branched. Leaves dirty yellow or olive-green, subimbricate, distichous, spreading; upper lobe oblong-orbicular, with a thickened quite entire margin; lower lobes obliquely ovate-lanceolate, obtuse, suberect, appressed. Perianth terminal, elongate, flattened, narrowed below; margins thickened; lips truncate, quite entire.—Syn. Hep. 261.

**Northern** and **Middle** Islands: Bay of Islands, *J. D. H.*; Auckland, *Sinclair*; Nelson, *Mantell*.—The thickened margins of the leaf at once distinguish this curious species.

7. **R. dentata**, *Mitten*; *mss.*—*Lejeunia dentata*, *Mitten* in Fl. N. Z. ii. 159. Leaves orbicular, unequally 2-dentate, with an obtuse sinus, dorsal margin 3-dentate; ventral quite entire; lobule large, ovate-oblong, obtuse, quite entire.

**Northern** Island, *Herb. Mitten*; Auckland, *Sinclair*.

## 21. MADOTHECA, Dumortier.

Stems creeping or pendulous, often large, pinnately branched. Leaves distichous, incubous, with an inflexed membranous lobule at the ventral base. Stipules large, decurrent. Inflorescence diœcious. Fruit lateral, nearly sessile. Involucral leaves, 2 or 4, 2-lobed. Perianth obovoid, 2-convex; mouth 2-lipped, entire or lacerate. Calyptra globose, persistent, bursting below the apex. Capsules on short fruitstalks, globose; elaters free, with 2 spiral fibres; spores large, angular. Antheridia as in *Frullania*.

A considerable and widely distributed genus, both tropical and temperate.

1. **M. Stangeri**, *Gottsche*;—Fl. N. Z. ii. 155. Stems 3-12 in. long, erect; branches spreading. Leaves yellow-green, closely imbricate, very convex, decurved, suborbicular; apex incurved, quite entire or with the ventral margin waved; lobule triangular-ovate, outer side somewhat reflexed; involucral unequal, toothed. Stipules ovate, obtuse, gibbous in the centre; margins subrecurved, quite entire. Perianth lateral, sessile, 2-lipped; lips toothed.—Syn. Hep. 281. *M. partita*, Hook. f. and Tayl. in Lond. Journ. Bot. 1844, 392; Syn. Hep. 279. *M. elegantula*, Mont. Voy. au Pôle Sud, 232. t. 18. f. 3.

Throughout the **Northern** and **Middle** Islands: abundant, *Menzies*, etc. **Lord Auckland's** group: on trunks of trees, *J. D. H.*—A very fine but variable species, the southern representative of the European *M. platyphylla*, Dum.

## 22. LEJEUNIA, Libert.

Stems prostrate or creeping. Leaves distichous, incubous. Stipules usually present. Inflorescence diœcious. Fruit lateral or terminal on proper branches. Involucral leaves 2, 2-lobed. Perianth ovoid or obovoid, terete or angled; angles winged or crested; mouth 3-4-lobed. Calyptra obovoid, persistent, bursting below the apex. Capsule on short fruitstalk, globose, pale, 4-cleft halfway; elaters adhering to the valves, erect, upper end truncate, with 1 spiral fibre. Antheridia as in *Frullania*, on proper branches.

A very large tropical and temperate genus, of which 236 species were published in the 'Synopsis Hepaticarum' in 1844, and many have been added since.

§ 1. *Stipules* 0.

1. ***L. lævigata***, *Mitten in Fl. N. Z.* ii. 157. Stem 1 in. long, creeping, flattened and closely appressed, pinnate. Leaves imbricate, suborbicular, obtuse; lobule oblong or obovate, 3-dentate, one-quarter smaller than the leaf; involucre narrower, with obtuse entire lobes. Perianth obconic or turbinate, obtuse; dorsal face flat; ventral with 2 appressed folds.

**Northern** Islands: on fronds of ferns, leaves, etc.; Auckland, *Sinclair*; Tehawera, *Colenso*.

2. ***L. pulchella***, *Mitten in Fl. N. Z.* ii. 157. *t.* 103. *f.* 2. Stem very minute,  $\frac{1}{12}$ – $\frac{1}{8}$  in. long. Leaves white, membranous, remote, incurved recurved or flexuous, oblong, obtuse, quite entire; lobule small, subquadrate, 2–3-dentate; involucre smaller, narrower. Perianth lateral, flattened, obconic or obcordate, retuse; margins quite entire.

**Northern** Island: Manawata river, *Colenso*.

§ 2. *Stipules* large, suborbicular, quite entire or very inconspicuously toothed.

3. ***L. olivacea***, *Hook. f. and Tayl. Fl. N. Z.* ii. 157. Stems 1 in. long, procumbent, subpinnate. Leaves brownish, wrinkled when dry, imbricate, spreading, oblong-ovate, rounded, incurved and often white at the apex. Lobule small, oblong, acute, tumid, quite entire; involucre narrower, acute. Stipules large, orbicular-obovate, obscurely emarginate. Perianth oblong-obovate, flattened, 3-ribbed on either face.—*Syn. Hep.* 334. *Phragmicoma olivacea*, *Mitten*, mss.

**Northern** Island: Wellington, *Stephenson*, *Colenso*; Auckland, *Sinclair*.

4. ***L. scutellata***, *Mitten in Fl. N. Z.* ii. 155. *t.* 102. *f.* 4. Stem 1–2 in. long, tufted; branches pinnate, ascending. Leaves olive-green or brown, imbricate, spreading, convex, ovate-oblong, quite entire; apex acute, recurved, sinuate at the base; lobule small, quite entire, orbicular, involute; involucre immersed, ovate-lanceolate, nearly entire; lobules lanceolate. Stipules orbicular-obovate, with lanceolate lobules; involucre 2-fid. Perianth axillary, oblong, with entire angles.—*Thysananthus scutellatus*, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1846, 383; *Syn. Hep.* 739.

**Northern** and **Middle** Islands: Bay of Islands, *Cunningham*, etc.; Nelson, *Mantell*; Otago, *Hector and Buchanan*.

5. ***L. anguiformis***, *Hook. f. and Tayl. Fl. N. Z.* ii. 156. *t.* 102. *f.* 5. Stem 1–1½ in. high. Leaves olive-green or brownish, imbricate, spreading, oblong-ovate, quite entire; apex obtuse or acute and ventral margin incurved; lobule half as long, narrow, elongate, rounded at the apex, quite entire; involucre broader, with an acute lobule. Stipules larger, orbicular, broader than long, quite entire. Perianth obovate, compressed; margins and apex toothed; faces obscurely keeled.—*Thysananthus anguiformis*, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1844, 567; *Syn. Hep.* 289.

**Northern** Island: Taranua, on trees, *Colenso*.

Two species, of which descriptions were published by Dr. Taylor, but of which the specimens were not returned to the Hookerian herbarium, are referred with probability, by Mr. Mitten, to this, viz. *L. mollis*, *Mitten*, *Fl. N. Z.* ii. 157 (*Ptychanthus*, *Hook. f. and Tayl. l. c.* 334), with leaves sinuate, plicate at the base, and stipules smaller (Bay of Islands,



*J. D. H.*); and *Z. ophiocephala*, Mitten, Fl. N. Z. ii. 157 (*Thysananthus*, Hook. f. Tayl. l. c. 384), with an acute lobule and stipules with recurved tips (Bay of Islands, *Sinclair*). To these may be added *L. plicatiscypha*, Gottsche, Syn. Hep. 748; Fl. N. Z. ii. 156 (*Phragmicoma*, Hook. f. and Tayl. l. c.).

§ 3. *Stipules large, many-toothed.*

6. **L. Stephensoniana**, Mitten in Fl. N. Z. ii. 155. t. 102. f. 3. Stems  $1\frac{1}{2}$  in. long, dichotomously branched. Leaves olive-brown, imbricate, oblong-ovate, acute, quite entire, flat or with the apex incurved or involute; ventral margin incurved; lobule small, toothed. Stipules obovate, subtruncate, toothed; margins slightly recurved.

**Northern** Island: Wellington, *Stephenson*.—Described from a fragment picked from off mosses sent to Mr. Mitten.

§ 4. *Stipules 2-dentate or 2-fid.*

a. *Leaves ciliolate or papillose.*

7. **L. papillata**, Mitten in Fl. N. Z. ii. 158. t. 103. f. 5. Stems  $\frac{1}{8}$ – $\frac{1}{3}$  in. long, creeping, branched. Leaves pale green, rather remote, spreading, deflexed, falcate, ovate-acinaciform, rounded at the incurved apex, ciliolate, with papillæ all round; dorsal margin convex; ventral rather concave; lobule small, inflated; involucre smaller, with an ovate lobule. Stipules not ciliate, orbicular, 2-fid; segments 1–2-toothed. Perianth obovate-quadrate, retuse, compressed, 5-gonous; angles papillose.

**Northern** Island: creeping on fern fronds and mosses, *Sinclair*, *Colenso*; Wellington, *Stephenson*.

b. *Leaves not ciliate, very obtuse, rarely acute in L. rufescens. Stipules minute.*

8. **L. rufescens**, Lindenberg.—*L. implexicaulis*, Fl. N. Z. ii. 158. Stems  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, creeping, branched. Leaves olive-green, cellular, imbricate, spreading or suberect, oblong-obovate, orbicular-ovate or ovate, convex; apex incurved, obtuse subacute or truncate; lobule small, involute. Stipules usually narrower than the branch, more or less orbicular, acutely 2-fid. Perianth lateral, sessile, compressed, with 1 keel on the dorsal and 2 on the ventral side.—Syn. Hep. 366. *L. implexicaulis*, *mimosa*, *albo-virens*, and *primordialis*, Hook. f. and Tayl. in Lond. Journ. Bot. 1844, 397, 398, and 1845, 92; Fl. Antarct. 166. t. 66. f. 4.

**Northern** and **Middle** Islands, probably common, creeping amongst mosses, etc.; Manawata river, *Colenso*; Wellington, *Stephenson*; Canterbury, *Travers*. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (Fuegia, Tasmania).—Probably a very common southern species (of which *L. primordialis* is an exceedingly small variety), and the representative of the European *L. serpyllifolia*.

9. **L. cucullata**, Nees. Stems very minute, capillary, almost microscopic, creeping, branched. Leaves pale green, lax, erecto-patent, concave, orbicular-quadrate, subtruncate, quite entire; lobule as large as the leaf, incurved, appressed; summit angled; base tumid. Stipules most minute, 2-fid; segments linear, subincurved.—Syn. Hep. 389. *L. plicatiloba*, Hook. f. and Tayl. Fl. Antarct. 166; Syn. Hep. 369; Mont. Voy. au Pôle Sud, 218.

**Lord Auckland's** group, *Hombroon*; creeping on *Parmelia*, *J. D. H.*

γ. *Leaves not ciliate, sometimes papillose at the edge, subacute or acute. Stipules minute.*

10. **L. latitans**, *Hook. f. and Tayl. Fl. N. Z. ii. 159.* Stems minute, creeping, slender,  $\frac{1}{4}$ – $\frac{1}{8}$  in. long. Leaves pale green, distant, erecto-patent, ovate, acute or acuminate; margins papillose; lobule ovate, involute, half the size of the leaf; involucre united with the obovate involucre stipule. Stipules minute, 2-fid; segments lanceolate, obtuse.—Syn. Hep. 345; Fl. Antart. 166.

**Northern** Island: on moist banks, *Colenso*. **Lord Auckland's** group: creeping on mosses, etc., *J. D. H.*

11. **L. comitans**, *Hook. f. and Tayl. Fl. N. Z. ii. 159.* Stems minute,  $\frac{1}{10}$ – $\frac{1}{8}$  in. long, procumbent, with thickened shoots. Leaves pale olive-green, closely imbricate, spreading, minutely cellular, tumid, oblong, subacute, quite entire; apex recurved; lobule ovate, inflexed, subacute. Stipules minute, distant, orbicular, 2-fid. Perianth axillary, obcordate, flattened dorsally, with 1 broad rib on the ventral face.—Syn. Hep. 760.

**Northern** Island: Bay of Islands, with *L. mollis*, *J. D. H.*

δ. *Leaves not ciliate, obtuse. Stipules rather large, conspicuous.*

12. **L. nudipes**, *Hook. f. and Tayl. Fl. N. Z. ii. 158. t. 103. f. 4.* Stems minute, creeping, branched,  $\frac{1}{4}$  in. long. Leaves pale green, distant, spreading, concave, opaque, obovate, narrowed at the base, rounded at the apex, subcrenulate; lobule small, narrow, subacute; involucre similar. Stipules ovate, acutely 2-fid, involucre obovate with ovate segments. Perianth clavate, narrow below and substipitate, 5-gonous, retuse, with crenulate angles.—Syn. Hep. 372.

**Northern** Island: Bay of Islands, creeping over mosses, *J. D. H.*

14. **L. thymifolia**, *Nees;—Fl. N. Z. 158.* Stem creeping, branched. Leaves yellow, imbricate, oval, narrowed at the obtuse apex, quite entire; lobule orbicular, truncate; involucre ovate-lanceolate, obtuse, with a tongue-shaped lobule. Stipules large, imbricate, ovate-cordate, 2-fid. Perianth terminal and lateral, obovate, 5-gonous.—Syn. Hep. 373.

**Northern** Island: Bay of Islands, on bark, *Sinclair*; Cape Turnagain, *Colenso*. (Java, S. America, Madeira.)

15. **L. tumida**, *Mitten in Fl. N. Z. ii. 157. t. 103. f. 3.* Stems very slender,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, much branched. Leaves bright green, loosely imbricate, cells pellucid, very convex, spreading, rather horizontal, obliquely ovate-oblong, rounded at the apex, quite entire; lobule small, inflexed, inflated; involucre with a longer obtuse lobule. Stipules orbicular, acutely 2-fid. Perianth obovoid, tumid, retuse, inflated and obscurely 5-angled at the summit.

**Northern** Island: probably common on trees, *Sinclair*, *Colenso*, *Stephenson*, etc. **Campbell's** Island, *J. D. H.* (Tasmania, Australia.)

## 24. FRULLANIA, Raddi.

Stems prostrate or creeping, flattened, usually purplish-brown. Leaves

distichous, incubous, convex, quite entire, with a simple or rarely double lobule at or near the base, which is erect or appressed, club-shaped lunate trumpet-shaped or inflated. Stipules sometimes rooting at the base, usually 2-fid. Inflorescence diœcious. Fruit terminal on proper branches. Involucral leaves 2 or 3, not auricled. Perianth ovoid or obovoid, terete or 3-4-angled; mouth contracted, tubular. Calyptra pyriform, persistent, bursting below the apex. Capsule on a very short fruitstalk, globose, 4-cleft halfway; elaters adhering to the valves, truncate, with 1 spiral fibre; spores large, irregular. Antheridia in the saccate bases of closely imbricate 2-lobed perigonal leaves. Pistillidia 2 or 4 in each perianth.

A very large genus, growing on rocks, bark of trees, etc.; a few species are European, but most are southern.

§ 1. *Lobule lunate or kidney-shaped, rarely hemispherical, usually longer than broad, more or less parallel to the curvature of the leaf.*

\* *Lobules 2. Stipules quite entire.*

1. **F. cornigera**, *Mitten in Fl. N. Z.* ii. 163. *t.* 104. *f.* 8. Stems 1-2 in. long, pinnate. Leaves olive-brown, opaque, suborbicular, with hyaline margins; lobules 2, brown, tubular, decurved. Stipules transversely oblong, quite entire.

**Northern and Middle Islands:** Bay of Islands, *J. D. H.*; Port Cooper, *Lyall*.

\*\* *Lobule solitary. Base of the leaf inflexed. Stipules 2-fid.*

2. **F. patula**, *Mitten in Fl. N. Z.* ii. 159. *t.* 104. *f.* 1. Stem 1 in. long, pinnate. Leaves olive-brown, loosely imbricate, flattish, orbicular; ventral base broadly inflexed; lobule small, brown, reniform; involucral elongate, ovate, obtuse, ventricose below and sheathing the perianth. Stipules orbicular-cordate, very large, shortly 2-fid. Perianth small, quite smooth.

**Northern Island:** Tarawera, on dead bark, Manawata river, on fences, etc., *Colenso*.

3. **F. squarrosula**, *Hook. f. and Tayl. Fl. N. Z.* ii. 160. *t.* 103. *f.* 6. Stems 1 in. long, 2-pinnate. Leaves olive-green or almost black, patent and recurved, squarrose, ovate, rounded at the apex; dorsal margin often white; ventral sinuate in the middle; lobule small, on the incurved margin of the leaf kidney-shaped or hooded, brown; involucral with an ovate acute lobule. Stipules orbicular-ovate, 2-fid. Perianth oblong-ovate, obtuse, smooth at the back, convex and obscurely 2-keeled above; ventral face with one keel.—*Syn. Hep.* 412.

**Northern Island:** probably common, Bay of Islands, on Lichen and rocks, *J. D. H.*; Port Nicholson and Titikura, etc., *Colenso*; Wellington, *Stephenson*.

4. **F. pycnantha**, *Hook. f. and Tayl. Fl. N. Z.* ii. 160. Very similar to *F. squarrosula*, but the perianth is covered with minute foliaceous scales, the stipules keeled down the middle, with subrecurved margins, the involucral stipule and leaves more cut.—*Syn. Hep.* 411.

**Northern and Middle Islands:** probably common, on Lichens, etc., from the Bay of Islands, *J. D. H.*, to Thomson's Sound, *Lyall*.

5. **F. scandens**, *Mont. Voy. au Pôle Sud*, 227. *t.* 19. *f.* 2;—*Fl. Ant-art.* 165. Stem  $1\frac{1}{2}$  in. long; branches pinnate, very short. Leaves pale

green, closely imbricate, obliquely ovate-orbicular, quite entire, obtuse, concave, lower margin incurved?; lobule lunate; involucrel not seen; stipule orbicular, 2-dentate.

**Lord Auckland's** group: on branches of trees, *Hombroon*.—I have seen no specimens, and am uncertain, from the figure, whether the base of the leaf is incurved or not.

\*\*\* *Lobule solitary*. *Base of leaf not inflexed*. *Stipules 2-fid (toothed in F. Hampeana)*.

6. **F. falciloba**, *Hook. f. and Tayl. Fl. N. Z.* ii. 160. Stems 1–2 in. long, branched. Leaves brown, ovate or orbicular-oblong, slightly incurved; lobule large, elongate, falcate; involucrel 2-lobed; lobule much cut. Stipules orbicular-oblong, 2-dentate; involucrel large, 2-fid, 1-dentate on each side. Perianth convex on the dorsal, and having a broad keel on the ventral face.—*Syn. Hep.* 423.

**Northern** Island: Wairarapa valley, on bark, *Colenso*. (Tasmania.)

7. **F. cranialis**, *Tayl.* Stems 1–2 in. long, tufted, procumbent, sub-pinnately branched. Leaves olive-brown, loosely imbricate, spreading, rounded, concave, quite entire; lobule helmet-shaped,  $\frac{1}{2}$  the size of the upper lobe. Stipules ovate, 2-fid, with one tooth on each side.—*Tayl. in Hook. Lond. Journ. Bot.* 1845, 86.

**Middle** Island: Canterbury, *Haust.* (Australia.)

8. **F. Hampeana**, *Nees*;—*Fl. N. Z.* ii. 160. Stems pinnate. Leaves pale green, imbricate,  $\frac{1}{2}$ -vertical, suborbicular; lobule arched, deflexed, acuminate. Stipules suborbicular, 6–8-toothed and 2-fid.—*Syn. Hep.* 426.

**Northern** Island: trunks of trees, Wairarapa valley, *Colenso*. (Australia, Tasmania.)—Readily recognized by the many-toothed stipules.

9. **F. spinifera**, *Hook. f. and Tayl. Fl. N. Z.* ii. 161. *t.* 104. *f.* 2. Stems 1–1 $\frac{1}{2}$  in. long, pinnate. Leaves brownish-green, loosely imbricate, diverging, broadly oblong; lobule small, arched, with acuminate ends; involucrel lanceolate, acute, with a lanceolate subulate 1-dentate lobule. Stipules orbicular, shortly 2-fid; involucrel broadly 2-fid, with lanceolate lobes. Perianth elongate, subcylindric, tumid, smooth; retuse with a mucronate apex.—*Syn. Hep.* 776.

**Northern** Island: Auckland, *Sinclair*; Tehawera, on trees in the forest, *Colenso*.

10. **F. deplanata**, *Mitten in Fl. N. Z.* ii. 161. *t.* 104. *f.* 3. Stem 1 in. long, pinnate. Leaves red-brown, diverging, imbricate, orbicular-ovate or oblong; apex rounded, incurved; lobule large, falcate, recurved, acuminate; involucrel ovate, acute, entire or toothed, with a lanceolate toothed lobule. Stipules suborbicular, shortly 2-fid; involucrel elongate, laciniate. Perianth obcordate, elongate, flattened at the top, retuse, mucronate, smooth.

**Northern** Island: east coast and interior, on bark, *Colenso*; Wellington, on Lichens, *Stephenson*.

§ 2. *Lobule vertically elongate, clavate tubular trumpet-shaped or  $\frac{1}{2}$ -orbicular.*

\* *Lobule on the surface of the leaf,  $\frac{1}{2}$ -orbicular.*

11. **F. reptans**, *Mitten in Fl. N. Z.* ii. 161. *t.* 104. *f.* 4. Stem small, slender,  $\frac{1}{2}$  in. long, creeping, pinnate. Leaves dark olive-brown or red or



blackish, loosely imbricate, spreading, orbicular-obovate; lobule very large, occupying the centre of the leaf, and  $\frac{1}{2}$  smaller, compressed, semiorbicular, toothed; involucre with a lanceolate 1-dentate lobule. Stipules small, cuneate, 4-toothed; involucre 2-fid, 1-dentate on each side. Perianth oblong-obovate, mucronate; dorsal face flat, 2-keeled; ventral convex, 4-keeled; keels toothed above.

**Northern Island:** East coast, on bark of *Edwardsia*, *Colenso*; Auckland, *Sinclair*. (Tasmania.)

2. **F. pentapleura**, *Hook. f. and Tayl. Fl. N. Z.* ii. 162. t. 104. f. 7. Stems small, slender,  $\frac{1}{8}$ – $\frac{1}{6}$  in. long, pinnate. Leaves red-brown or blackish or olive-green, spreading, orbicular; lobule on the face of the leaf, compressed,  $\frac{1}{2}$ -orbicular; involucre ovate, with an ovate 1-dentate lobule. Stipules small, suborbicular, 2-fid, entire or dentate on each side. Perianth oblong-obovate, mucronate, compressed, 2-keeled on each face; keels and margins waved.—*Syn. Hep.* 775.

**Northern Island:** Tarawera, in woods, *Colenso*; Auckland, *Sinclair*.

\* Lobule on the margin of the leaf, cylindric, with a dilated trumpet-shaped mouth.

3. **F. ptychantha**, *Montagne*;—*Fl. N. Z.* ii. 163. Stems 2 in. long, creeping, pinnate, thickened upwards. Leaves from olive-green to red-purple, loosely imbricate, very tender; cells minute, obovate-cuneate; lobule small, pedicelled, oblong, inflated, opening downwards; involucre acuminate, quite entire, united with the stipular. Stipules ovate-oblong,  $\frac{1}{2}$  as large as the leaf, deeply acutely 2-fid. Perianth exserted, pyriform, 9-plicate.—*Mont. Voy. Pôle Sud*, 225. t. 19. f. 3; *Syn. Hep.* 442. *F. myosota*, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1844, 393.

**Northern and Middle Islands:** Wellington, *Stephenson*, *Lyall*. **Lord Auckland's** group and **Campbell's Island**, *Hombron*, *J. D. H.*

14. **F. hypoleuca**, *Nees*;—*Fl. N. Z.* ii. 163. General characters of *F. ptychantha*, but the leaves are closely imbricate, broader; the lobule distant from the stem, with an interposed triangular lamina, the involucre leaves subsessile, and the perianth concave on the dorsal face, 1-keeled on the ventral.—*Syn. Hep.* 443.

**Northern Island:** Wellington, on Lichens, *Stephenson (in Herb. Mitten)*. (Oahu.)

15. **F. fugax**, *Hook. f. and Tayl. Fl. N. Z.* ii. 161. t. 104. f. 5. Stem small, slender, creeping, pinnate,  $\frac{1}{2}$  in. long. Leaves red-brown, imbricate, diverging, orbicular; lobule very large, cylindric-oblong, with a dilated mouth below; involucre elongate, obtuse, with a subulate-lanceolate lobule. Stipules small, 2-fid, and 1–2-toothed; involucre more deeply 2-fid; segments entire or toothed. Perianth sessile, oblong; dorsal face flat, 2-keeled; ventral with 1 broad keel.—*Syn. Hep.* 445.

**Northern Island:** probably common on Lichens, Bay of Islands, *J. D. H.*; east coast, etc., *Colenso*; Wellington, *Stephenson*.—The perianths here described are not fully formed.

16. **F. incumbens**, *Mitten in Fl. N. Z.* ii. 162. t. 104. f. 6. Very similar in size and structure to *F. fugax*, but paler. Leaves more incurved; lobule very much smaller. Stipules not toothed, and with the obovate perianth keeled sharply on its ventral face.

**Northern Island** : on bark, Wairarapa valley, east coast and interior, *Colenso*.

17. **F. rostrata**, *Hook. f. and Tayl. Fl. Antarct.* 163. Stems minute, slender, subpinnate. Leaves red-brown, imbricate, spreading, orbicular, subapiculate; lobule oblong, with 2 short processes on its inner margin; involucrel orbicular-oblong, incurved, apiculate. Stipule minute, orbicular. Perianth obovate from a slender narrow base, much broader than the stem.—*Syn. Hep.* 445.

**Lord Auckland's group** : on *Parmelia enteromorpha*, *J. D. H.*

18. **F. magellanica**, *Spreng.*; —*Fl. Antarct.* 162. Stems 2–3 in. long, much 2-pinnately branched. Leaves red and olive-brown or blackish, imbricate, orbicular-ovate, sometimes obscurely denticulate; lobule obovate, distant from the stem; involucrel acute, entire, rarely with the lobule toothed. Stipule minute, appressed, 2-fid. Perianth obovate, impressed on the dorsal face, obtusely keeled on the ventral.—*Syn. Hep.* 446.

**Campbell's Island** : on alpine rocks, *J. D. H.* (*Fuegia*.)

\*\*\* *Lobule on the margin of the leaf, erect or diverging, clavate or pedicelled.*

19. **F. aterrima**, *Hook. f. and Tayl. Fl. N. Z.* ii. 162. Stems  $\frac{1}{2}$ –1 in. high, small, slender, sparingly branched. Leaves black, shining, upper purplish, imbricate, spreading, concave, oblong or orbicular; tips recurved; cells large at the ventral side; lobule erect, pyriform, inflated; involucrel longer, narrower, acute. Stipules minute, 2-partite, and 1–2-toothed. Perianth obovate, 3-quetrous.—*Fl. Antarct.* t. 66. f. 3; *Syn. Hep.* 450.

**Northern Island** : Wairarapa valley and Ruahine range, Beech-trees, etc., *Colenso*. **Lord Auckland's group** : rocks on the hills, *J. D. H.*

20. **F. congesta**, *Hook. f. and Tayl. Fl. N. Z.* ii. 162. Very similar to *F. aterrima*, of a red-brown colour, with rounder stipules, which are never toothed, the leaves have not the cluster of enlarged cells at the base, and the involucrel are white at the tips.—*Fl. Antarct.* 164; *Syn. Hep.* 451.

**Northern Island** : probably common on Lichens, bark of trees, rocks, etc., Auckland, *Sinclair*; Titikura, Tehawera, etc., *Colenso*; Wellington, *Stephenson*. **Lord Auckland's group** : on rocks and bark, *J. D. H.*

21. **F. allophylla**, *Hook. f. and Tayl. Fl. Antarct.* 163. t. 66. f. 1. Stems minute, slender, flexuous,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, sparingly branched. Leaves red-brown, black when dry, lax, distant, erecto-patent or spreading, convex, subpetiolate, obliquely ovate, acute or obtuse, sometimes 2–3-toothed; cells large; lobule oblong or clavate, pedicelled, diverging at the base, then incurved or decurved. Stipules minute, 2-fid; segments lanceolate, but sometimes clavate like the lobules.

**Campbell's Island** : on hills, intermixed with other *Hepaticæ*, *J. D. H.*—A minute, very curious and beautiful little plant.

22. **F. reticulata**, *Hook. f. and Tayl. Fl. Antarct.* 163. t. 66. f. 2. Stems 1–2 in. long, pinnate, flattish. Leaves black, young red-purple, distichous, imbricate, very tender, convex, lower orbicular, entire, upper ovate, coarsely toothed; cells large, pellucid; lobules clavate, sometimes absent in the lower leaves, sometimes 2-fid or double. Stipules 4-partite; segments subulate, or some or all clavate.

**Lord Auckland's group:** rocks on the mountains, *J. D. H.*—A larger plant than *F. rostrata*, with larger leaf-cells and 4-partite stipules.

23. **F. gracilis**, *Nees*. Stem creeping, pinnately and 2-pinnately branched. Leaves imbricate, orbicular, obtuse, quite entire; lobule auricled, oblique, exposed; involucre inciso-serrate. Stipules imbricate, flat, subrotund, 2-fid, quite entire; involucre inciso-serrate. Perianth 3-gonous, prismatic, smooth; dorsal surface convex, ventral with 1 keel.—Syn. Hep. 452; Mont. in Voy. au Pôle Sud, 223.

**Lord Auckland's group**, *Hombroun*.—I have seen no Auckland Island specimens; the species is also found in Java and the Malayan peninsula.

#### 24. FOSSOMBRONIA, Raddi.

Frond prostrate, creeping, lobed pinnately; lobes succubous, distichous, quadrate, 3–5-lobed, flaccid. Stipules 0. Fruit terminal, or lateral by the growth of the stem. Involucre of subulate leaves, adnate to the perianth, which is campanulate; mouth large, lobed. Calyptra pyriform. Capsule on a short fruitstalk, globose, irregularly 4-valved; elaters short, with 2–3 spiral fibres. Antheridia naked on the under surface.

A small genus, found in various parts of the world, intermediate between the frondose and leafy *Hepaticæ*; the stem may be regarded as a frond pinnatifid to the midrib, or as furnished with adnate leaves.

1. **F. pusilla**, *Nees*;—*Fl. N. Z.* ii. 163. Minute; stems  $\frac{1}{4}$  in. long, simple or forked. Leaves obliquely spreading, lower waved and lobed, upper crisped, 3–4-lobed or -angled. Perianth obconic, toothed.—Syn. Hep. 467.

**Northern Island:** east coast and Hawke's Bay, on banks, palings, etc., *Colenso*. (America, Canary Islands, S. Africa, Tasmania, Kerguelen's Land.)

2. **F. intestinalis**, *Tayl. Fl. N. Z.* ii. 163. Minute; stems  $\frac{1}{6}$ – $\frac{1}{4}$  in. long, with purple rootlets. Leaves ascending, tumid, plaited, convolute, incised and lobed; lobes acute. Perianth campanulate, crenate.—Syn. Hep. 469.

**Northern Island:** Bay of Islands, *J. D. H.* (Tasmania.)

#### 25. NOTEROCLADA, Taylor.

Frond appressed to the ground, creeping, rooting, stout, forked, pinnately lobed; lobes broad, sessile, decurrent, soft, quite entire. Stipules 0. Fruit lateral or terminal. Involucre confluent with the perianth, erect; cylindrical or compressed; mouth somewhat 2- or 4-lobed. Capsule subglobose, on a slender fruitstalk, 4-valved or bursting irregularly; elaters short, with 2? spiral fibres. Antheridia immersed in the back of the stem.

A small Brazilian and Australian genus, closely allied to *Fossombronia*.

1. **N. porphyrorhiza**, *Mitten in Fl. N. Z.* ii. 163. Stem simple,  $\frac{1}{2}$  in. long, flexuous, with the leaves  $\frac{1}{4}$  in. broad, green or purple. Leaves distichous, oblique, approximate, ovate or suborbicular; margins papillose. Perianth small, obovate; lobes crenate-dentate.—*Androcryphia*, *Nees*; Syn. Hep. 470. *Jungermannia*, *Nees*; Montagne in Ann. Sc. Nat. 1839, t. 1. f. 1.

*N. confluens*, Tayl. in Lond. Journ. Bot. 1844, 478; Fl. Antarct. 446. t. 161. f. 7.

**Northern** and **Middle** Islands: Titikura, in watercourses, *Colenso*; Auckland, *Sinclair*; Otago, lagoons, *Lindsay*. (Brazil, Fuegia, Falkland Islands, Kerguelen's Land.)

## 26. PETALOPHYLLUM, Gottsche.

Fronds simple or 2-fid, rooting below from the midrib, lamellate above. Inflorescence diœcious. Fruit from the back of the midrib. Involucre confluent with the perianth, quadrate, campanulate; mouth broad, open, undulate, toothed. Calyptra large, globose, as long as the perianth or shorter. Capsule large, globose, on a slender fruitstalk, bursting irregularly; elaters filiform, with 2 or 3 spiral fibres; spores large, reticulate. Antheridia dorsal at the forks, crowded, globose.

A small British and Australian genus.

1. **P. Preissii**, *Gottsche*;—*Fl. N. Z.* ii. 164. Frond  $\frac{1}{4}$  in. long, obovate or cuneate; ventral surface rugulose, striate; dorsal with radiating lamellæ, which are connate, forming little pockets at the costa.—Syn. Hep. 472.

**Northern** Island: Hawke's Bay, on clay soil, *Colenso*. (S.W. Australia.)

## 27. ZOOPSIS, Hook. f. and Tayl.

Frond very slender, tufted, creeping, rigid, silvery-green, almost capillary, sparingly branched, of large tumid hexagonal cells; midrib stout; margins waved. Fruit lateral. Involucre of a few lanceolate scales. Perianth large, pedicelled, obovate-oblong, deeply laciniate.

A very curious little plant, which I discovered in Lord Auckland's group, and has since been found in Tasmania and New Zealand.

1. **Z. argentea**, *Hook. f. and Tayl. Fl. N. Z.* ii. 164. Fronds  $\frac{1}{4}$ – $\frac{1}{2}$  in. long,  $\frac{1}{20}$  in. broad, of two lateral and one antero-posterior series of cells surrounding a central cord of filiform cells; each of the marginal cells stands out like the tooth of a saw, and is terminated by an incurved bristle, which is not represented in the figure in Fl. Antarct. The fruit is immature.—Syn. Hep. 473; Fl. Antarct. 167. t. 66. f. 6.

**Northern** Island: probably common amongst mosses, etc., in various localities, *Colenso*; Auckland, *Lyall*, *Sinclair*. **Lord Auckland's** group: on the ground at the roots of tree-ferns, and amongst mosses, *J. D. H.*

## 28. PODOMITRIUM, Mitten.

Fronds erect from a creeping rhizome, stalked, oblong, with a stout midrib, membranous, entire. Inflorescence diœcious. Involucre from the base of the frond on the ventral surface, shortly pedicelled, with a few scales at the base. Perianth tubular, much longer than the involucre. Calyptra included, bearing a few barren pistils, subcampanulate; mouth lacerate. Capsule on a long fruitstalk, ovoid, 4-valved; elaters filiform. Antheridia crowded on short pedicelled spikes.

The only species known; it is almost impossible to distinguish its barren fronds from those of the British *Steetzia Lyallii* and *Symphogyna subsimplex*, Mitten.



1. **P. Phyllanthus**, *Mitten in Fl. N. Z.* ii. 164. Fronds 1 in. high, oblong-lanceolate, dull green, obtuse, quite entire.—*Symphyogyna*, *Fl. Ant-arct.* 167. *Jungermannia*, *Hook. Musc. Exot.* t. 95. *Diplolæna cladorrhizans*, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1844, 570.

Throughout the **Northern** and **Middle** Islands: abundant on stumps of tree-ferns, rocks, etc., *Menzies*, etc. **Lord Auckland's** group, *J. D. H.* (Tasmania.)

## 29. STEETZIA, Lehmann.

Frond linear, more or less dichotomously branched, with a midrib. Inflorescence dicecious. Involucre at first terminal, dorsal by the subsequent elongation of the frond, seated on the midrib, cupshaped, torn. Perianth tubular; mouth toothed. Calyptra as long, torn at the apex. Capsule on a slender fruitstalk, ovoid; elaters free, with 2 fibres. Antheridia dorsal, on the midrib, covered by minute fimbriated leaves.

A considerable genus, scattered over both the temperate and tropical regions of the globe.

1. **S. Lyellii**, *Nees*;—*Fl. N. Z.* ii. 165. Frond 2–3 in. long, oblong or linear, crenulate or subserrate.—*Blyttia*, *Syn. Hep.* 475 (*Steetzia*, 785); *Hook. Brit. Jung.* t. 77.

**Northern** Island: clay banks, East and South coast, apparently common, *Colenso*. (Europe, America, Australia.)

2. **S. tenuinervis**, *Hook. f. and Tayl. Fl. N. Z.* ii. 165. Frond slender, 1–2 in. long, pea-green, tips dilated, 2-lobed; margin crenulate from the prominent cells, substance thin; midrib very slender.—*Diplolæna*, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1844, 570.

**Northern** Island, *Colenso*; Auckland, *Sinclair*.—Probably a variety of *L. Lyellii*.

3. **S. ? xiphioides**, *Hook. f. and Tayl. Fl. N. Z.* ii. 165. Frond bright green, 2 in. long, procumbent,  $\frac{1}{12}$  in. broad, sparingly dichotomously branched; margin crenulate. Involucre immature, of about 5 lanceolate leaves.—*Diplolæna*, *Hook. f. and Tayl. in Lond. Journ. Bot.* 1844, 567. *Blyttia*, *Syn. Hep.* 476 (*Steetzia*, 785).

**Northern** Island: Bay of Islands, *J. D. H.*; Manawatu river, often under water, *Colenso*; Auckland, *Sinclair*.—A very dubious plant, totally unlike any other *Steetzia*, and compared by Mitten with large forms of *Metzgeria furcata*.

## 30. SYMPHYOGYNA, Mont. and Nees.

Fronds membranous, linear, dichotomously or flabellately branched, stalked, arising from a creeping rhizome, midrib stout. Inflorescence monœcious or dicecious. Fruit from the nerves, usually at the forks. Involucre a toothed scale. Perianth 0. Calyptra smooth, exerted, coriaceous, fimbriated at the apex by abortive pistillidia. Capsule on a slender fruitstalk, 4-valved; valves often cohering by their apices; elaters with 2 spiral fibres. Antheridia in the midrib; perigonial leaves imbricate, tumid, incised, membranous.

A large tropical and south temperate genus, unknown in the north temperate hemisphere.

1. **S. flabellata**, *Montagne*;—*Fl. N. Z.* ii. 165. Stem 1–3 in. high. Frond orbicular or reniform, 3–5-partite in a fan-shaped manner,  $\frac{1}{2}$ –1 in.

broad; segments linear, 2-fid, nerved, obtuse. Fruit in the forks, involucreal scales 2-lobed.—Syn. Hep. 481. *Jungermannia*, Hook. Musc. Exot. t. 13; Labill. Fl. Nov. Holl. t. 254. f. 1.

Mountainous parts of the **Northern** and throughout the **Middle** Islands: from Tehawera, *Colenso*, to Dusky Bay, *Menzies*. **Lord Auckland's** group, *Hombroon*, *J. D. H.* (Tasmania.)

2. **S. leptopoda**, *Hook. f. and Tayl. Fl. N. Z.* ii. 165. Similar to *S. flabellata*; stipes faintly winged; frond pale green, more tender, 3-chotomous, segments broader.—Syn. Hep. 482.

**Northern** and **Middle** Islands: Bay of Islands, *J. D. H.*; Hokianga, *Jolliffe*; Tara-rua and Wairarapa, *Colenso*; Otago, *Lyall*.

3. **S. Hymenophyllum**, *Montagne*;—*Fl. N. Z.* ii. 166. Stipes 1–2 in. high. Frond flat, erect, dark green, obtruncate or obovate, twice or thrice 2-fid; segments linear, serrate, emarginate. Fruit at the union of the laciniae; involucreal scale orbicular, toothed. Calyptra cylindric.—Syn. Hep. 480. *Jungermannia*, Hook. Musc. Exot. t. 14.

Throughout the **Northern** and **Middle** Islands: common, from the Bay of Islands, *J. D. H.*, to Dusky Bay, *Menzies*. (Tasmania.)

4. **S. rhizobola**, *Nees*;—*Fl. N. Z.* ii. 166. Stipes short. Frond procumbent, lanceolate, subdivided, dark green, serrate, attenuated and rooting at the apex.—Syn. Hep. 483. *S. obovata*, Hook. f. and Tayl. in Lond. Journ. Bot. 1844, 581. *Jungermannia*, Hook. Musc. Exot. 87.

**Northern** Island: Bay of Islands, *J. D. H.*; Auckland, *Bolton*; East coast, Hawke's Bay, etc., *Colenso*. (Bourbon, Tasmania.)

5. **S. subsimplex**, *Mitten* in *Fl. N. Z.* ii. 166. Frond linear, flat, green,  $1\frac{1}{2}$  in. long,  $\frac{1}{8}$  broad, simple or forked, retuse, attenuate at the base, quite entire, tender; cells hexagonal. Involucreal scale toothed and lacerate, sub-2-partite. Calyptra clavate, crowned with pistillidia.

**Northern** Island: Bay of Islands, *J. D. H.*; Auckland, *Sinclair*; East coast, on tree-ferns, *Colenso*. **Stewart's** Island, *Lyall*.

### 31. METZGERIA, Raddi.

Fronds more or less branched, flat, linear; midrib distinct. Inflorescence diceious. Fruit from the lower surface of the frond, on the midrib. Involucre a ventricose 2-lipped scale. Perianth 0. Calyptra ascending, obovoid, rather fleshy. Capsule on a long fruitstalk, ovoid; elaters adhering to the tips of the valves, with one spiral fibre. Antheridia 1–3, from the midrib beneath the frond, in a 1-leaved involucre. Ovoid buds occur on the narrow tips of the fronds.

A cosmopolitan and very variable plant, of which all the New Zealand forms are also European. A few other species are known in South America.

1. **M. furcata**, *Nees*;—*Fl. N. Z.* ii. 166. Fronds  $\frac{1}{2}$ –3 in. long, tender, linear, forked or dichotomously branched, glabrous, the margin and costa beneath setulose or naked. Calyptra ascending from the side, hairy and setose.—Syn. Hep. 502.

Abundant throughout the **Northern** and **Middle** Islands, *Colenso*, etc.; and in **Lord Auckland's** group. (Cosmopolitan.)

32. **ANEURA**, Dumort.

Frond pinnatifid or 2-pinnate, sinuate, rather thick, with a broad undefined nerve or 0. Inflorescence diœcious. Fruit from the margin of the frond underneath. Involucre short, cupshaped, torn. Perianth 0. Calyptra subcylindric, fleshy. Capsule ovoid or oblong, on a slender fruitstalk; elaters attached to the tips of the valves, each with a single broad fibre. Antheridia immersed in marginal receptacles.

In the New Zealand Flora, Mr. Mitten adopted the generic name of *Sarcomitrium* in preference to that of *Aneura*, because the fronds have a nerve or thickened axis, and indeed consist of little else than axis. Names are, however, as often founded on appearances as on facts, and if the appearance is obvious (as in this case) the name should be retained. A considerable genus, more common in the southern than in the northern hemisphere.

1. **A. alterniloba**, Hook. f. and Tayl. *Fl. N. Z.* ii. 167 (*Sarcomitrium*). Frond dark green, 3–4 in. long, flattened, vaguely branched; branches alternate,  $\frac{1}{8}$  in. broad, obtusely lobed, crenate, tips rounded; margin minutely and remotely toothed. Calyptra setulose.—Syn. Hep. 496.

**Northern** Island: wet banks and watercourses, Bay of Islands, *J. D. H.*; East coast and interior, etc., *Colenso*, *Sinclair*.

2. **A. palmata**, *Nees*;—*Fl. N. Z.* ii. 167 (*Sarcomitrium*). Fronds pinnate, primary flat, procumbent; branches ascending, pinnatifidly palmate; segments linear, truncate or obtuse. Fruit lateral; involucre shallow, torn. Calyptra tubercled.—Syn. Hep. 498.

**Northern** Island: Beech forests on the East coast, *Colenso*. (Tasmania, Europe.)

3. **A. crassa**, *Nees*;—*Fl. N. Z.* ii. 167 (*Sarcomitrium*). Frond thick and leathery, almost horny, blackish-green, procumbent, pinnatifid; segments obtuse.—Syn. Hep. 500.

**Northern** Island: dense forests, East coast and interior, *Colenso*. (Tasmania.)

4. **A. pinnatifida**, *Nees*;—*Fl. N. Z.* ii. 167 (*Sarcomitrium*). Frond simple or pinnatifid, flat or channelled; branches horizontal, dilated at the apex, 2-pinnatifid or toothed, obtuse. Calyptra smooth, puberulous.—Syn. Hep. 495.

**Middle** Island: Southland, *Lyall*. (Europe, America, Bourbon, India, Malay Islands, Australia, Tasmania.)

5. **H. multifida**, *Dumort.*;—*Fl. N. Z.* ii. 167 (*Sarcomitrium*). Frond pinnately multifid or decomposed; primary biconvex, rigid; branches pectinate, horizontal, linear; involucre lateral in the primary or secondary branches, turbinate, fleshy. Calyptra tubercled.—Syn. Hep. 497.

Throughout the **Northern** and **Middle** Islands: by watercourses, wet banks, etc., from Bay of Islands, *J. D. H.*, to Port Cooper, *Lyall*. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (Europe, America, India, Australia, Tasmania, Fœgia.)

6. **A. prehensilis**, *Mitten*;—*Fl. N. Z.* ii. 167 (*Sarcomitrium*). Fronds loosely tufted, erect, incurved; primary branches compressed, brown, pruinose when dry, winged; lobes pinnate, secund, flat, linear, with a thick nerve. Calyptras solitary or 2, at the bases of the upper lobes, brown, scabrous, elongate-obovate, with torn involucreal scales at the base.—*Metzgeria*, Hook. f. and Tayl. *Fl. Antart.* 445; Syn. Hep. 505.

**Northern** and **Middle** Islands: Manawatu river, on dead wood, *Colenso*; Port Nicholson, *Lyall*; Otago, *Lindsay*. (Fuegia.)

7. **A. eriocaula**, *Mitten*;—*Fl. N. Z.* ii. 168 (*Sarcomitrium*). Frond 3–6 in. long, flexuous, pinnatifid, pubescent; primary creeping, compressed; branches alternate, ovate, 2-pinnatifid; divisions linear, obtuse, glabrous, costate, brown. Calyptra subaxillary, oblong-cylindric, fleshy, glabrous, rather rough.—*Metzgeria*, Syn. Hep. 505. *Jungermannia*, Hook. Musc. Exot. t. 72.

**Middle** Island: Dusky Bay, *Menzies*; Port Nicholson, *Lyall*; Otago, *Hector* and *Buchanan*. (Tasmania.)

8. **A. cochleata**, *Mitten* in *Fl. Tasman.* ii. 240 (*Sarcomitrium*). Frond short, very thick and fleshy, loosely caespitose, procumbent, creeping, pinnatifidly irregularly lobed; lobes ovoid, cochleate, concave, very thick and fleshy, with upturned or connivent margins, 2-lobed at the apex, loosely cellular and spongy internally. Calyptra fleshy, cylindric, setulose.—*Riccia cochleata*, Hook. f. and Tayl. in *Fl. Antarct.* t. 66. f. 5; Syn. Hep. 612.

**Lord Auckland's** group: on stones, in tufts of mosses, etc., *J. D. H.* (Tasmania.)

### 33. **PLAGIOCHASMA**, Lehm. and Lindb.

Frond short, thick, rigid. Inflorescence monœcious? Fertile receptacles stalked, capitate, 2–4-lobed; lobes small, ascending. Involucres 4, large, erect, 1-capsuled, concealing the lobes, ovoid, 2-valved. Perianth 0. Calyptra fugacious. Capsule almost sessile, horizontal, globose, splitting irregularly; elaters moderately long; spores enclosed in a transparent wrinkled membrane. Antheridia immersed in sessile disks.

A genus of a dozen species or so, inhabiting warm climates.

1. **P. australe**, *Nees*;—*Fl. N. Z.* ii. 168. Frond 1 in. long, linear-elongate, green with purple margins; tips retuse; margins crenulate, innovations on the ventral side; scales broad, purple, acute, with hyaline tips, upper projecting beyond the margin. Fruit in the middle of the frond; peduncle short or long, with linear-lanceolate scales at the base. Female receptacle with 2–4 fruits, scaly below; subglobose, male papillose.—Syn. Hep. 515. *Fegatella australis*, Hook. f. and Tayl. in *Lond. Journ. Bot.* 1844, 572.

**Northern** Island: Bay of Islands, *J. D. H.*; Hokianga, *Jolliffe*; Tehawera and Patea, *Colenso*.

### 34. **MARCHANTIA**, Linn.

Frond broad, growing flat on the ground, branched, thick, with a broad ill-defined midrib or none, covered below with coloured imbricating scales and tubular rootlets. Inflorescence diœcious, on the surface of the frond. Receptacles peltate, stalked, rayed, fruiting on the under surface. Involucres pendulous, alternate with the rays, 2-valved, lacerate, each with 3–6 3-cleft perianths. Capsules stalked, pendulous, dehiscing at the apex by revolute valves; elaters slender; spores smooth. Antheridia immersed in the under surface of male receptacles.—Gemmæ occur abundantly in sessile cups on the surface of the frond.



A large genus, found in all parts of the world, easily recognized by forming green scale-like patches on the ground, paths, walls, and especially on the mould of green-house plants.

1. ***M. tabularis***, *Nees*;—*Fl. N. Z.* ii. 168. Patches large, oblong, lobed; terminal lobes toothed, nerveless. Peduncles 1–4 in. long. Female receptacles with 8–9 star-like rays; involucre with 2–4 perianths,  $\frac{1}{4}$  shorter than the ray, tumid, white, 4-fid; segments lacerate; central beard slender, fibrillose; fruitstalk short. Male receptacles on separate plants on shorter peduncles, orbicular, 4-lobed; lobes crenate; anthers in 8 radiating lines.—*Syn. Hep.* 525. *M. polymorpha*, *Fl. Antarct.* 168 and 446, not of *Linnaeus*.

Throughout the **Northern** and **Middle** Islands, in wet places abundant, and in **Lord Auckland's** group and **Campbell's** Island. (S. Africa, Tasmania, Fuegia, Falkland Islands, Kerguelen's Land.)—This is the southern representative of the ubiquitous northern *M. polymorpha*, differing from that plant in the more convex fronds without a midrib, more minute cells, and more prominent pores.

2. ***M. nitida***, *Lehm. and Lindenb.*;—*Fl. N. Z.* ii. 168. Frond 1 in. long, green, linear, dichotomous, thickened in the middle, dilated at the obcordate tips; margin undulate, crenate, under surface purple. Female receptacle excentric, convex, papillose, 8–10-rayed; peduncle paleaceous at the base, slender, flexuous, pilose; rays dilated, emarginate, crenulate, beardless, costate above; involucre 2-valved, ciliated, 2–3-fruited. Perianth plicate, purple at the mouth.—*Syn. Hep.* 532.

**Northern** and **Middle** Islands: Tuaraiawa river, *Colenso*; East Cape, *Colenso*; Canterbury, *Haast*. (India.)

3. ***M. foliacea***, *Mitten in Fl. N. Z.* ii. 168. Frond 2–3 in. long, subcoriaceous, flat, smooth, glossy above; pores small, pale; below deep purple; margin entire, undulate. Female receptacle excentric, convex, umbonate, about 8-lobed; peduncle 1 in. long, with purple scales; lobes dilated, foliaceous, subcrenate; involucre pale, lacerate, ciliate. Cups with gemmæ, funnel-shaped, with toothed ciliate margins.

**Northern** and **Middle** Islands: Cape Turnagain and base of the Ruahine range, *Colenso*; Hokiang, *Jolliffe*; Nelson, *Mantell*. (Tasmania.)

4. ***M. macropora***, *Mitten in Fl. N. Z.* ii. 169. Fronds 1–2 in. long,  $\frac{1}{8}$  in. broad, dirty green, linear, dichotomous; margin flat, quite entire; pores large, with purple edges; under surface dark purple; scales few. Female receptacle subhemispherical, excentric, about 5-lobed, warted; lobes 2-partite; peduncle  $\frac{1}{2}$  in. long, with a few lanceolate scales; involucre with purple lacerate margins, and clothed with lanceolate purple laciniae at the base.

**Northern** Island: wet banks, Makororo river and Ahuriri, *Colenso*; Auckland, *Sinclair*, etc.

5. ***M. pileata***, *Mitten in Fl. N. Z.* ii. 169. Frond 3 in. long, glaucous-green,  $\frac{1}{4}$  in. broad, dichotomous, linear, flat, smooth; pores minute, margined with white; margins entire; underneath dark purple. Female receptacle subexcentric, hemispherical, tuberculate, naked below; margin crenate; peduncle  $\frac{1}{2}$  in. long, smooth, purple; margin of the involucre torn.

**Northern** Island: wet banks, Makororo river, *Colenso*. (Tasmania.)

35. **DUMORTIERA**, Nees.

Habit and most of the characters of *Marchantia*, but involucre with 1 capsule, horizontal, opening by a vertical slit. Perianth 0. Capsule shortly stalked; elaters very long; spores muricate.

A small genus, scattered over various parts of the globe, growing on the ground in moist places.

1. ? **D. hirsuta**, Nees;—*Fl. N. Z.* ii. 169. Frond dichotomous, bright green, tender, pellucid, with no midrib, crenulate-undulate, hairy below. Female receptacles with many fruits, convex, covered with scattered bristles; margin and involucre hirsute, bearded round the top of the peduncle.—*Syn. Hep.* 343. *D. dilatata*, *Syn. Hep.* 543. *Hygropila dilatata*, Hook. f. and Tayl. in *Fl. Antarct.* 168.

**Northern** and **Middle** Islands: abundant, from Bay of Islands, *J. D. H.*, to Akaroa, *Raoul*, in watery places, etc. **Lord Auckland's** group, *J. D. H.*—One of the largest and commonest *Hepaticæ* of New Zealand, but never found in fruit and hence doubtful as to genus and species. The specimens are much larger than any of *D. hirsuta*, from other parts of the world; the latter species is very variable and found in various parts of America and South Africa.

36. **REBOULIA**, Nees.

Frondose, growing on rocks or earth; habit of *Marchantia*; midrib strong, broad. Female receptacle peduncled, flat, conical, or hemispherical, 1-6-lobed, almost to the middle; lobes thick, their margins forming a 2-valved involucre, containing one capsule. Perianth 0. Calyptra ovoid, soon rupturing, leaving a cup at the base of the capsule. Capsule exserted, subglobose, membranous, lacerate or suboperculate; elaters with 2 spirals; spores tubercled. Male receptacle sessile, discoid.

A small genus of three species, scattered over the world.

1. **R. hemisphærica**, *Raddi*. Frond dichotomous, with innovations that are rounded and emarginate at the apex, green above, purple below; receptacle variable in shape; hairs at its base very slender.—*Syn. Hep.* 548.

**Northern** and **Middle** Islands: Auckland, *Knight*; Nelson, *Mantell*; Canterbury, *Travers*. (Cosmopolitan.)

37. **FIMBRIARIA**, Nees.

Frondose; habit of *Marchantia*; midrib keeled. Inflorescence monœcious. Female receptacle hemispherical, concave below; margins expanding and forming 4 campanulate, pendent, 1-capsuled involucre. Perianth projecting beyond the involucre, oblong, splitting into many laciniae at the mouth. Calyptra fugacious. Capsule sessile, globose, bursting transversely; elaters short, with 1 or 2 spirals; spores muricate. Antheridia not on receptacles, but immersed in the frond.

1. **F. Drummondii**, *Tayl.*;—*Fl. N. Z.* ii. 169. Frond 1-1½ in. long, linear-elongate, green or purplish. Female receptacle conical, obtuse, papillose with vesicular cells, almost naked below; perianths white and purplish, broadly ovate, sub-12-fid; segments broad, flat, cohering at the apex; peduncle 2 in. long, slender, black-purple.—*Syn. Hep.* 566 and 791.

**Northern and Middle Islands:** heights of Cape Kidnapper and Wairarapa valley, etc., *Colenso*; Nelson, *Mantell*. One of the largest species of the genus. (Swan River, Tasmania.)

2. **F. australis**, *Hook. f. and Tayl. Fl. N. Z.* ii. 170. Fronds 1 in. long, linear, dichotomous, tender, 2-lobed at the apex, below purple, with a few small lanceolate obtuse scales. Female receptacle conico-hemispherical, tubercled, sub-4-lobed, bearded below with long hairs; perianths ovate, 12-14-fid, pale; segments cohering by their tips.

**Northern and Middle Islands:** banks of Mohaka river, *Colenso*; Auckland, *Bolton*; Nelson, *Mantell*. (Tasmania.)

3. **F. tenera**, *Mitten in Fl. N. Z.* ii. 170. Frond  $\frac{1}{2}$  in. long,  $\frac{1}{8}$  in. broad, green, dichotomous; divisions oblong or obovate, deeply 2-fid, very tender, veined, fertile cuneate; below green or brownish. Female receptacle small, rather convex, 3-4-lobed, naked below, rugulose; margin crenulate; perianths small, shortly conic, 8-fid; segments pale brown, ovate-lanceolate, separate at the apices.

**Northern Island:** clay banks at Pahiawa and Patea, *Colenso*. (Tasmania.)

### 38. TARGIONIA, Micheli.

Fronds appressed to the ground, rooting, thick and coriaceous, linear, forked, porous on the upper surface, scaly on the lower. Involucre at the apex of the frond, 2-valved. Perianth 0. Calyptra persistent, enclosing the capsule, breaking away from over it, its bulb immersed in the frond; style deciduous. Capsule on a very short fruitstalk, membranous, irregularly torn; elaters with 2 or 3 spiral fibres. Antheridia in lateral disk-like receptacles, on proper branches. Gemmæ 0.

A small genus, scattered over the globe, growing in the ground and on tufts of mosses, etc.

1. **T. hypophylla**, *Linn.*;—*Fl. N. Z.* ii. 170. Frond linear-obovate or cuneate, rigid, with an undefined midrib, pores equal; scales densely imbricate, outer reaching the margin.—*T. Michelii*, *Corda.*; *Syn. Hep.* 574.

**Northern Island:** common on moist banks, *Colenso*, etc. (Europe, N. Africa, N. America, Tasmania.)

### 39. ANTHOCEROS, Micheli.

Fronds growing flat on the ground, more or less orbicular, radiating, thick, opaque, green; margins lacerate or crenate. Inflorescence monœcious. Fruit on the upper surface of the frond. Involucre tubular. Perianth 0. Calyptra conical. Capsule pedicelled, of 2 narrow linear erect lobes; columella filiform; elaters flexuous; spiral fibres imperfect or 0; spores muricate. Antheridia sessile, in cup-shaped involucre.—Gemmæ also immersed in the substance of the frond.

A very common genus in various parts of the world, forming often large green patches in moist places.

1. **A. lævis**, *Linn.*;—*Fl. N. Z.* ii. 171. Frond 1-2 in. long, flat, radiately branched; lobes crenate, smooth, nerveless, tender; involucre cylindrical; mouth obliquely truncate, with broad scarious edges.—*Syn. Hep.* 586.

*Dendroceros leptohymenius*, Hook. f. and Tayl. in Lond. Journ. Bot. 1844, 575; Syn. Hep. 580. *Pellia carnosa*, l. c. 576; Syn. Hep. 490. *A. punctatus*?, Hook. f. and Tayl. in Fl. Antaret. i. 168.

**Northern and Middle Islands**: abundant from the Bay of Islands, *J. D. H.*, to Akaroa, *Raoul*. **Campbell's Island**, *J. D. H.* (Europe, America, Tasmania.) A very common and variable plant. Some of the numerous New Zealand plants referred to this that are not in fructification may be referable to other things.

2. **A. Jamesoni**, *Tayl.*;—*Fl. N. Z.* ii. 171. Frond flat, nerveless, nearly smooth, much cut into narrow laciniae; margin lobulate; lobules undulate and crenate. Involucre obliquely truncate, smooth. Capsule elongate, valves cohering at their tips.

**Northern Island**: Auckland, *Bolton*. (Quito, Fuegia.)

3. **A. giganteus**, *Lehm. and Lindenb.*;—*Fl. N. Z.* ii. 171. Frond  $\frac{1}{2}$ –1 in. long, linear, forked, costate, pinnatifidly laciniate; margin crisped. Involucre cylindric, obliquely truncate. Capsule 2 in. long and more, dehiscing at the apex.—Syn. Hep. 588.

**Middle Island**: Dusky Bay, *Menzies*; Port Cooper, *Lyall*.

4. **A. Colensoi**, *Mitten in Fl. N. Z.* ii. 171. Frond 1–2 in. broad, brownish-black, inordinately pinnatifid and pinnately lobed; lobes flabellate sinuate and crenate; lobules small, pale, pellucid, smooth above and below. Involucre rugulose, with little folds, obscurely 2-lipped. Capsule arcuate, dehiscing on one side, short, pale brown; peduncle included.

**Northern Island**: tops of the Ruahine mountains, *Colenso*; Auckland, *Sinclair*, *Bolton*.

#### 40. **RICCIA**, *Micheli*.

Small, frondose, terrestrial or aquatic, often of thick consistence. Fronds simple or divided, usually orbicular or oblong, often stellate. Inflorescence monœcious or diœcious. Perianth 0. Fruit immersed in the frond. Involucre 0. Calyptra cohering with the globose capsule, and crowned with a persistent styloform apex; columella and elaters 0; spores angular; antheridia imbedded in the frond.

A considerable genus, found in clay banks, ditches, etc., in all parts of the globe.

1. **R. acuminata**, *Tayl.*;—*Fl. N. Z.* ii. 171. Frond 1 in. diameter, glaucous-green, solid, orbicular, stellate, naked below; segments linear, dichotomous, channelled; margins erect. Fruit tumid, crowded in the centre of the frond.—Syn. Hep. 793.

**Northern Island**: fern hills, Hawke's Bay, *Colenso*.

2. **R. natans**, *Linn.*;—*Fl. N. Z.* ii. 173. Fronds floating, pale yellow above, bordered with dull purple, obcordate, channelled, simple or proliferous from the notches, with long purple serrate fimbriae below; substances cavernous.—Syn. Hep. 606.

**Northern Island**: Lake Roto-a-Kiwa, *Colenso*. (Europe, America.)

3. **R. fluitans**, *Linn.*;—*Fl. N. Z.* ii. 173. Fronds rather membranous, dichotomous, flat or subchannelled, green above and below, dichotomous;



branches linear-elongate, tips emarginate, 2-fid or forked; substance cavernous towards the tips.—Syn. Hep. 610.

**Northern** Island: deep water, head of Wairarapa valley, *Coleenso*. (Europe, America, India, S. Africa.)

## ORDER VI. CHARACEÆ.

Branching, submerged, slender, freshwater plants, with whorled branches, sometimes coated with carbonate of lime. Stems and branches formed of a few very long simple tubular cells placed end to end, with often smaller tubes on the surface of one central large one. Reproductive organs of two kinds; 1, solitary or clustered naked spores or *nucules*, each coated with spirally arranged cells, placed in the axils of the branches; 2, spherical *globules*, all axillary, of a bright or dull red or orange colour, consisting of 8 triangular disciform scales; in the centre of the inner surface of each scale a columnar tubular cell is fixed, which points towards the centre of the globule, and at its end bears a bundle of jointed threads, each joint (or cell) of which contains a spiral antherozoid. *Gemmæ* are often produced on the root; and stellate bodies, capable of reproducing the species, often replace the globules.

A most curious Order of plants, abounding in many sluggish freshwater streams of temperate climates, remarkable for the singular nature of its reproductive bodies, its obscure affinities, and the distinctness with which the circulation of the fluids in the stems and branches of many species may be seen with a low power of the microscope.

Each node or joint of the stem or branches consists of but one length of cells, sometimes upwards of 1 in. long, with very transparent walls (except when coated with carbonate of lime), in which the sap may be watched, forming two currents side by side, and not separated by anything, one ascending, the other descending.

The spore (or nucule) consists of a central ovoid cell, full of starch-granules, coated by 5 long cells spirally wound round it, their tips being free and having a cavity between them, down which the antherozooids are supposed to pass and impregnate the central cell. The spore germinates by the formation of a cell at its tip, from which rootlets descend and a stem ascends.

The red globules (or antheridia) have their walls divided by three circles, two vertical, and three equatorial, and consist of eight disks, each of which is in shape an equilateral spherical triangle. Each disk is formed of radiating tubular cells; a tubular cell proceeds from the centre of the disk to that of the globule, bearing at its apex a few small cells, from which the filaments, whose joints contain the spermatozooids, originate.

The various species of the genus are very fetid, giving off an odour of sulphuretted hydrogen.

I am indebted to my friend Professor A. Braun, of Berlin, for determining the New Zealand species of this Order. The specimens were in most cases insufficient for a full and satisfactory description.

### 1. NITELLA, Agardh.

Articulations of the stem and branches formed of 1 or more tubes, never coated with carbonate of lime. Crown of the nucule formed of about 10 cells, in 2 series, usually deciduous.

A large genus, found in all parts of the globe.

\* EUNITELLA.—*Globules terminal at the forks of the branches.*

1. *N. hyalina*, Agardh. Monœcious; stem branched, rather stout. Whorls crowded, of many rays; longer rays 8, 3 times forked, shorter about

twice as many, intercalated in pairs, simple or forked; terminal forks rather swollen. Nucules large, subglobose, with 9 striæ.—Wallmann, *Essai Fam. Charac.* 14.

**Northern** Island: Rupahi Lake, Auckland, *Hochstetter* (*Herb. A. Braun*). (Cosmopolite.)

2. **N. Hookeri**, *Braun in Hook. Kew Journ. Bot.* i. 199. Monœcious. Whorls lax, lower remote, upper forming lax comose heads, of 6–8 rays; rays 2–3-forked to or below the middle, one of them usually further divided; ultimate articulations of about 3 joints, the first elongated, the rest shorter, forming a 2-celled mucronate apex. Nucules usually in pairs; crown short, obtuse.—*Chara australis*, Tayl. in *Fl. Antart.*, not of Brown.

**Northern** Island: still waters, Bay of Islands, *Colenso, J. D. H.*; Wellington, *Ralph*. (Tasmania, Australia, Kerguelen's Land.)

3. **N. interrupta**, *Braun, mss.* Monœcious. Sterile whorls remote, of 6 rays; rays usually 4–5 times forked to the middle, divisions 2–3-cellular; fertile whorls minute, contracted, arranged in interrupted spikes. Spores solitary on the secondary branches, brown, with 7 striæ; globules in the primary branches.—*Braun, mss.*

**Northern** Island: Waikate river, *Telinek*.

## 2. CHARA, Linn.

Articulations of the stem and branches formed of several series of cells, often coated with carbonate of lime. Crown of the nucule formed of 5 spreading cells.

Less frequent in the southern than in the northern hemisphere.

1. **C. foetida**, *A. Braun*. Monœcious. Stems fine, striate, brittle, coated with carbonate of lime; of twice as many tubes as branches (in 2 series); upper branchlets of one tube, without external tubes. Nucules with 13 striæ, as long as 2 of the branchlets that subtend them. Stipules or short branchlets at the base of each whorl.—Wallmann, *Essai Fam. Charac.* 63.

**Northern** Island: Bay of Islands, *J. D. H.* (Europe, etc.)

2. **C. contraria**, *A. Braun*. Monœcious. Stem coated with carbonate of lime, finely striated, minutely papillose or strigillose; the primary tubes prominent, hence exposing the papillose surfaces, which in *C. foetida*, to which this is closely allied, are hidden between the secondary tubes.—Wallmann, *Essai Fam. Charac.* 64.

**Northern** Island, *Colenso*. (Cosmopolite.)

## ORDER VII. LICHENES.

Perennial plants, of comparatively small size, low organization, and very various forms, rarely green in colour, consisting chiefly of a horizontal ascending or erect, simple or branched, foliaceous membranous coriaceous cartilaginous or crustaceous or powdery vegetative portion, called the **THALLUS**, which bears organs of fructification. The **THALLUS** usually spreads horizon-

tally over dead wood, bark of trees or rocks, but in many genera it is terrestrial and erect, or pendulous from rocks or branches; it may be *effuse*, that is, without determinate shape; or *effigurate*, that is, having a definite shape; or *scaly*, formed of small coriaceous scales; or *crustaceous*, of a thick crusty substance; or *powdery*; or *leprous*, when formed of minute membranous scales; or *granular*; or *foliaceous* (also called *frondose*). The attachment of the foliaceous thallus may be by the whole under-surface, or by *fibrils* (bundles of short filaments), and may be by one point or many. When the thallus is erect, it is often called a *podetium*, a name also given to the erect cylindrical portion of a horizontal thallus. Reproductive organs of four kinds. I. APOTHECIA, circular or variously-shaped shields cups slits or prominences, formed of closely-packed jointed filaments and closed tubes (*asci*), which latter contain simple or septate spores. II. SPERMAGONES, minute open cavities in the thallus, containing filaments (*sterigmata*), upon which are most minute colourless bodies (*spermatia*). III. PYCNIDIA, or superficial spermagones. IV. GONIDIA; granules often scattered like powder over the thallus, which are analogous to buds, and reproduce the species.

A large Natural Order, found in all climates and latitudes. Upwards of 1300 species are described, very many of which have most extensive ranges in distribution, from the arctic circle to the equator and in both hemispheres. Like most other Cryptogamic Orders, they chiefly affect damp temperate climates.

The internal substance of the thallus usually consists of three layers:—

1. The *cortical*, which is tough, leathery, and formed of densely-packed minute cells, with thick walls.

2. A green *gonidic* layer, formed of loose bright green or yellow globular cells, which either have a proper cellular coat, and are called *gonidia*, or have none, and are called *gonima*. These cells are almost peculiar to Lichens; they often burst through the upper layer in masses, called *soredia*, or are scattered like powder over the cortical layer, or fringe the lobes of the thallus. In the genus *Sticta*, they burst through the under surface of the thallus, and occupy small circular depressions or cups called *cyphellæ*. Many Lichens are extensively propagated by gonidia, which may be seen forming green or yellow powdery strata on bark, stones, etc.; these strata were formerly supposed to be independent Lichens, and constituted the genus *Lepraria*. Sometimes the gonidia invade the apothecium of Lichens, which gave rise to another false genus (*Variolaria*).

3. A *medullary*, spongy, filamentous or cottony layer, composed of a network of jointed delicate threads; these are sometimes developed downwards, forming rootlets or fibrils on the under surface of many horizontal thalli.

The *hypothallus* is a rudimentary horizontal stratum, from which the thallus grows, and is only distinguishable in the youngest state of the more highly organized Lichens, and lies beneath the crustaceous or granular thallus of the more lowly.

The *apothecia* are usually discoid dark-coloured bodies, occupying various portions of the thallus, rarely however (*Nephromium*) the under surface. They may be orbicular, linear (*lirellate*), sessile or stalked, superficial or sunk in the thallus, convex concave or subglobose, and of all colours. The apothecia consists of the *exciple* or *receptacle* and *thalamium*.

The *receptacle* is the enveloping part of the apothecium, and is formed of the substance of the thallus. When the apothecium is adnate to the thallus, the receptacle only borders it, and when the apothecium is peltate or stalked, the receptacle forms its under surface also; when the bordering portion is of the same colour as the thallus, it is called a *thalline* or *thallodal border*; when of a different colour, or that of the thalamium, it is called a *proper border*. The receptacle may be altogether absent, or almost enclose the thalamium, or form a globular capsule, called a *perithecium*. The *thalamium* is usually solitary in each receptacle, but sometimes there are several, which are separate or confluent. It consists of a series of vertical elongate microscopic bodies, rising from a layer of minute cells, called the *hypothecium*; and they are usually held together by a transparent gelatine. The vertical bodies are two, *paraphyses* and *thecae* or *asci*. The paraphyses are the most numerous, they are linear, subcla-

vate, transparent, jointed bodies, whose terminal cells are thick-walled, are often crustaceous, warted, coloured, and adhering together from the hard surface of the thalamium. The asci are shorter vertical bodies, linear clavate or ellipsoid, tapering downwards, and consist of simple, thick-walled, transparent sacs, containing one or more, usually 8, very minute spores. At maturity the ascus breaks at the top, discharges the spores, and shrivels up, when fresh asci are developed from the hypothecium, and this process goes on as long as the apothecium, which is perennial, exists.

The *spores* are usually ellipsoid, but may be of any shape, and are simple or internally 1- or many-septate, or divided both transversely and longitudinally into *sporidia*.

The *spermagones* are microscopic, simple or compound cavities in the thallus, opening by pores, whose orifice is usually dark; they are full of gelatine, and contain *sterigmata*, which are simple or branched, articulate or inarticulate filaments; short, straight, articulate sterigmata are called *arthrosterigmata*. Upon the sides or tips of the sterigmata are the *spermata*, which are most minute, ovoid, ellipsoid, linear or acicular, straight or curved, colourless bodies. The spermata accumulate in the cavity of the spermagone and escape by its pore; they appear to be the analogues of the antherozoids of Algæ, etc., but have no cilia, and are not developed in antheridia. They are found in maturity usually in spring or summer, long before the spores of the apothecium are mature, and the relations between these two kinds of organ is unknown.

*Pycnides* are larger, thicker-walled, sometimes superficial spermagones, of which the sterigmata are simple, inarticulate, tubular, tapering pedicels, called *stylospores*, that bear at their tips bodies analogous to spermata, but larger and curved oblong and full of granular contents.

In *germination* the sporidia of a Lichen give off one or more branching filaments, whose branches interlace and form a network, the hypothallus, which again develops into the medullary stratum. A layer of colourless cells next spreads over the hypothallus, and amongst these the gonidia appear. In many Lichens, including most of the corticolous ones, there is no further development of thallus, the apothecia growing from this, and in some few the hypothallus alone is formed. In the higher forms however a cortical layer is added. The hypothallus, though often evanescent, is present as the fibrils of *Stictia*, the black fringe of *Lecidea geographica*; and in other forms or colours, in many other corticolous and rupicolous species.

The *food* of Lichens is not confined to the gaseous elements, for they take up mineral matter in abundance, especially carbonate and oxalate of lime, besides compounds of alumina, silica, iron, potash, soda, magnesia, and even of metals, as manganese and iron. Some species attain a great age, and some appear to burrow into the rock they inhabit; this burrowing has been attributed to a corroding power in the vegetable, but I should think it rather due to the action of the moisture they retain around them.

The study of Lichens is in every respect a most difficult one; the great master of the subject is Dr. Nylander, whose arrangement I have followed here, and would refer the student to his works for details I am unable here to give; these are, especially, his 'Synopsis Lichenum,' 'Énumération Générale des Lichens,' and 'Expositio Pyrenocarpeorum.'

Of British authors, Dr. Lauder Lindsay's 'Popular History of British Lichens' (12mo, with 22 plates) is a very good work, being very lucidly written and illustrated by capital figures.

The New Zealand Lichens were first hastily named and published by Dr. Taylor; since his death, my friend the Rev. C. Babington, a learned man and most sagacious Lichenist, worked them up with great care and skill for the 'New Zealand Flora'; and, more recently, Dr. Nylander has reviewed the majority of them, and verified most of Mr. Babington's determinations. A considerable number of species are introduced from a manuscript, kindly lent me by Dr. Lindsay, which contains the botanical results of his visit to the islands. Lastly, many additions are due to Dr. Knight's skilful researches amongst the corticolous genera, the results of which, by Mr. Mitten and Dr. Knight, are published in the Linnean Society's Transactions, illustrated by microscopic drawings of great beauty, made by Dr. Knight.

The following pretends to no more than a sketch of New Zealand Lichenology, and I expect that fully as many species remain to be discovered as are now known to exist in the islands. Since the following descriptions were written, Dr. Lauder Lindsay has communicated to the Botanical Society of Edinburgh, a list of Lichens found by himself at Otago, in which



a good many new species are indicated but not described. With regard to the other species there mentioned, having seen no specimens, I do not venture to introduce them, except by name at the end of each genus, as many may be identical with species described under other names by Babington, myself, or others. For myself, I frankly confess that I find it impossible to determine even the foliaceous Lichens satisfactorily, except by comparison of specimens; whilst the species of the crustaceous and corticolous genera are so difficult to examine, and impossible to describe in definite language, that I doubt any two independent workers coming to a tolerably close agreement regarding their limits and nomenclature, even if they worked upon the same specimens.

The two arrangements most in vogue are those of Fée and Nylander, the latter of whom I have followed. The size of the spores affords, in many cases, excellent specific characters, but to ascertain this accurately for the New Zealand species, would take many months of microscopic study, and as the value of such characters can only be judged of after a vast number of measurements, I have not pretended to introduce them.

#### KEY TO NYLANDER'S ARRANGEMENT OF THE GENERA, FOLLOWED IN THIS WORK.

##### FAMILY I. COLLEMACEI.

Thallus black-brown or olive-green, often subgelatinous. Gonidia without a cellular membrane, usually traversing the thallus in moniliform lines. Apothecia often red, white or pale inside.

##### TRIBE I. *Lichinei*. *Thallus shrubby*.

###### 1. LICHINA.

##### TRIBE II. *Collemei*. *Thallus usually horizontal, foliaceous, lobed*.

###### 2. COLLEMA. Thallus without a cortical cellular layer.

###### 3. LEPTOGIUM. Thallus with a cortical cellular layer.

##### FAMILY II. LICHENACEI.

Thallus variously coloured, not soft or gelatinous. Gonidia with a cellular membrane.

Series A. *EPICONIOIDEI*. Spores collected into a black powdery or crustaceous deciduous spore-mass.

##### TRIBE I. *Caliciei*. *Very minute. Thallus crustaceous or 0. Apothecia on slender, often filiform stalks*.

###### 4. CALICIUM.

##### TRIBE II. *Sphærophorei*. *Thallus shrubby, with dilated or swollen tips of the branches which bear the apothecia*.

###### 5. SPHÆROPHORON.

Series B. *CLADODIEI*. Thallus usually erect. Apothecia terminal on erect podetia, usually without a border. Spores often 8 in an ascus, oblong, rarely elongate and septate.

##### TRIBE III. *Bæomycei*. *Thallus horizontal, crustaceous. Apothecia pale red or brown. Spores simple or 1-3-septate*.

###### 6. BÆOMYCES.

##### TRIBE IV. *Cladonie*. *Thallus foliaceous or scaly, or of branched shrubby podetia. Apothecia convex, without a border. Spores simple*.

###### 7. CLADONIA.

TRIBE V. **Stereocauli.** *Thallus shrubby, tufted, with a solid medullary axis. Apothecia black or brown, terminal or lateral, with very rarely an obscure thalline border.*

8. STEREOCAULON. 9. ARGOPSIS.

Series C. **RAMALODEI.** *Thallus shrubby or filamentous, erect or pendulous, terete compressed or angular, without any basal crust or scales, tubular or solid: Apothecia usually with a thalline border.*

TRIBE VI. **Siphulei.** *Thallus of white opaque (fistular) podetia. Apothecia unknown.*

10. THAMNOLIA.

TRIBE VII. **Usneei.** *Thallus white or yellowish, branched, with a firm filiform axis. Apothecia peltate, with a thalline border which is often ciliate.*

11. USNEA.

TRIBE VIII. **Ramalinei.** *Thallus terete or compressed, erect or pendulous, with lax pith or hollow internally. Apothecia with a thalline border.*

12. ALECTORIA. 13. RAMALINA.

TRIBE IX. **Cetrariei.** *Thallus compressed, shrubby or foliaceous, lobed, shining, with a central pith. Apothecia marginal, with a thalline border. Spores small, simple.*

14. PLATYSMA.

Series D. **PHYLLODEI.** *Thallus foliaceous, depressed, lobed or lacinate, with a fibrous pith. Apothecia peltate or discoid, with or without a thalline border.*

TRIBE X. **Peltigerei.** *Thallus dilated, under surface naked. Apothecia usually marginal.*

15. NEPHROMA. 16. PELTIGERA.

TRIBE XI. **Parmeliei.** *Thallus dilated, rarely subterete or shrubby. Apothecia with a thalline border. Spermatogonia with arthrosterigmata.*

17. STICTA. 18. RICASOLIA. 19. PARMELIA.

TRIBE XII. **Gyrophorei.** *Thallus membranous or coriaceous, usually monophyllous, attached by a point. Apothecia with a border of the substance of the disk, often complicated or gyrose.*

20. UMBILICARIA.

Series E. **PLACODIEI.** *Thallus crustaceous, scaly, granular, powdery or evanescent. Apothecia with or without a thalline border, sometimes linear.*

TRIBE XIII. **Lecanorei.** *Thallus various. Apothecia with a thalline border, rarely without.*

21. PSOROMA. 24. AMPHILOMA. 27. LECANORA. 30. THELOTREMA.  
22. PANNARIA. 25. SQUAMARIA. 28. URCEOLARIA.  
23. COCCOCARPIA. 26. PLACODIUM. 29. PERTUSARIA.

TRIBE XIV. **Lecidiei.** *Thallus various. Apothecia without a thalline border.*

31. CÆNOGONIUM. 32. BYSSOCAULON. 33. LECIDEA.

TRIBE XV. **Graphidei.** *Thallus very thin, often invisible or beneath the bark. Apothecia like cracks, flat or plicate, with or without a border.*

34. GRAPHIS. 36. PLATYGRAPHIS. 38. STIGMATIDIUM. 40. MELASPILEA.  
35. OPEGRAPHIA. 37. PLAGIOGRAPHIS. 39. ARTHONIA.

Series F. *PYRENODEI*. Thallus various, peltate, scaly, areolate, continuous or 0. Apothecia opening by a punctiform pore.

TRIBE XVI. *Pyrenocarpei*.

41. NORMANDINA. 42. TRYPETHELIUM. 43. ENDOCARPON. 44. VERRUCARIA.

KEY TO FÉE'S ARRANGEMENT OF THE GENERA.

I. *Thallus adherent, crustaceous, amorphous (of delicate matted filaments in Cœnogonium and Byssocaulon).*

*a. Apothecia more or less stipitate.*

FAMILY I. *Bœomyceæ*. *Apothecia subglobose, fleshy, with a solid stipes.*

6. BÆOMYCES.

FAMILY II. *Calicioidæ*. *Apothecia hollow, goblet-shaped.*

4. CALICIUM.

*β. Apothecia sessile.*

FAMILY III. *Graphideæ*. *Apothecia linear.*

34. GRAPHIS; 35. OPEGRAPHIS; 36. PLATYGRAPHIS; 37. PLAGIOGRAPHIS; 38. STIGMATIDIUM; 39. ARTHONIA; 40. MELASPILEA.

FAMILY IV. *Verrucarieæ*. *Apothecia enclosed in tubercles of the thallus, with a small terminal opening.*

41. NORMANDINA; 42. TRYPETHELIUM; 43. ENDOCARPON; 44. VERRUCARIA (see *Thelotrema* and *Pertusaria* in Family VII.).

FAMILY V. *Leprarieæ*. *Apothecia of naked sporules.*

This family consists of rudimentary states of various Lichens.

FAMILY VI. *Variolarieæ*. *Apothecia opening into depressed hollow shields or pustules.*

Belongs to the same category as Family V.

FAMILY VII. *Lecanoreæ*. *Apothecia discoid with a more or less distinct border, sometimes thalline, and sometimes of the substance of the disk.*

*a. Thallus crustaceous.*

27. LECANORA; 28. URCEOLARIA; 29. PERTUSARIA; 30. THELOTREMA; 33. LECIDEA.

*β. Thallus of matted microscopic filaments.*

31. CŒNOGONIUM; 32. BYSSOCAULON.

II. *Thallus subfoliaceous, consisting of scales more or less combined together. Apothecia discoid, bordered, sessile.*

FAMILY VIII. *Squamaria*.

21. PSOROMA; 22. PANNARIA; 23. COCCOCARPIA; 24. AMPHILOMA; 25. SQUAMARIA; 26. PLACODIUM.

III. *Thallus shrubby or foliaceous, erect or horizontal, loosely attached by the base or by fibres from its lower surface.*

*A. Thallus horizontal, upper and under surfaces of different colour or texture, or both.*

*a. Thallus not fixed by a central point, spreading diffusely.*

FAMILY IX. **Parmeliaceæ.** *Thallus coriaceous or membranous. Apothecia discoid, fixed by the centre.*

17. STICTA; 18. RICASOLIA; 19. PARMELIA. (See *Platysma* in Family XIII.)

FAMILY X. **Collemateæ.** *Thallus when moist more or less gelatinous. Apothecia discoid, fixed by the centre.*

2. COLLEMA; 3. LEPTOGIUM.

FAMILY XI. **Peltigereæ.** *Thallus membranous. Apothecia adnate by their whole surface to the upper or under surface of the lobes of the frond, border 0 or very thin.*

15. NEPHROMA; 16. PELTIGERA.

*β. Thallus fixed by a central point, coriaceous.*

#### FAMILY XII. **Umbilicariæ.**

20. UMBILICARIA.

*γ. Thallus erect, pendent or ascending, rarely foliaceous or horizontally spreading; upper and under surfaces similar.*

FAMILY XIII. **Ramalineæ.** *Thallus compressed or flat, sometimes foliaceous, usually compressed and lacinate, rarely inflated or fistular. Apothecia discoid, with a thickened thalline border.*

12. ALECTORIA; 13. RAMALINA; 14. PLATYSMA.

FAMILY XIV. **Usneæ.** *Thallus terete, shrubby, erect or pendulous, with a central core or thread. Apothecia discoid, ciliated, with a very thin border or 0.*

11. USNEA.

FAMILY XV. **Corniculariæ.** *Thallus terete or compressed, without a central thread, cottony or fistulose within. Apothecia discoid.*

Has no New Zealand representative hitherto discovered.

FAMILY XVI. **Sphærophoreæ.** *Thallus erect or suberect, shrubby, terete or compressed, solid within. Apothecia convex or subglobose, sunk in extremities of branches.*

5. SPHÆROPHORON; 8. STEREOCAULON; 9. ARGOPHORA.

1. LICHINA, ranked by Fée as an *Alga*, is referable here artificially.

FAMILY XVII. **Cladoniæ.** *Thallus of erect, fistulose podetia, often dilated into cups, with or without a horizontal scaly portion. Apothecia hemispherical, without a border.*

7. CLADONIA; 10. THAMNOLIA.

#### 1. LICHINA, Agardh.

Thallus dark-brown, shrubby, rigid, containing beneath the cortical layer numerous naked blueish granules. Apothecia terminal, contained in globose receptacles, discoid with a thalline border; spores ellipsoid, simple.

A small genus of small Lichens, a good deal resembling *Alga*, and found on littoral rocks.

1. **L. pygmæa**, Ag. Thallus about  $\frac{1}{2}$  in. high, tufted, branched, compressed above.—Nyland. Synops. Lich. 91. Var. *β. intermedia*, Bab. in Fl. N. Z. ii. 311. t. 128 C. Thallus  $\frac{1}{4}$  in. high; branchlets slender, flattened.

Middle Island: Otago harbour. Var. *β.* on rocks, *Lyall*. (Europe.)

#### 2. COLLEMA, Acharius.

Thallus of various forms, cartilaginous or gelatinous, dull green or brown, with no distinct cortical stratum, traversed by simple tubular threads and



moniliform strings of naked granules. Apothecia rufous, with a thalline border; spores in eights, simple or variously divided.

A large genus of Lichens, found on rocks, bark, etc., in many parts of the world, somewhat resembling *Nostoc*. The New Zealand species do not appear to be taken up by Nylander in his 'Synopsis Lichenum.'

1. **C. flaccidum**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 309. Thallus membranous, lobed, dirty green, blueish or greenish-brown, larger lobes expanded, flexuous. Apothecia reddish, flat, middling-sized; spores ovoid or broadly fusiform, septate.

**Northern** Island: common on trees, *Colenso*, *J. D. H.*, etc. (Europe, America, Australia, etc.)

2. **C. pulposum**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 310. Thallus dirty green or greenish-brown, orbicular, lobed; lobes thick, crenate, subimbricate, often plaited. Apothecia middling-sized, flat, border entire; spores ovoid, usually 3-septate.—*Nyland. Synops. Lich.* 114.

**Northern** Island, *Colenso*.—Specimens imperfect, barren, hence very doubtful. I find none in the Herbarium. (Europe, America.)

3. **C. nigrescens**, *Ach.*—Var. *leucocarpum*, *Bab. in Fl. N. Z.* ii. 308. Thallus black-green, membranous, orbicular, depressed, lobed, radiately plaited. Apothecia lilac, glaucous, flat, crowded; border entire; spores cylindric-fusiform, usually many-septate.—*C. leucocarpum*, *Tayl. C. glaucophthalmum*, *Nyland. Synops. Lich.* 114, *ex ejus Lich. Nov. Caled.*

**Northern** Island, *Colenso*. **Middle** Island, *D'Urville*; Otago, *Lindsay*. (Found in all parts of the globe. *C. nigrescens* is cosmopolite, var. *leucocarpum* is found in Britain, Mexico, and New Caledonia.)

4. **C. fasciculare**, *Ach.*—Var. *Colensoi*, *Bab. in Fl. N. Z.* ii. 309. Thallus suborbicular, rigid, cartilaginous, blue when dry, fixed by the centre, green when moist; lobes rounded, sinuous, crisped. Apothecia crowded on the margins of the lobes, minute, rufous, without a border.

**Northern** Island: on twigs, *Colenso*.—I do not find this species in the Herbarium, nor any notice of it in Nylander's *Synopsis*.

5. **C. plicatile**, *Ach.* Thallus greenish-brown, imbricate, lobed; lobes erect or ascending, plaited, crisped. Apothecia scattered, reddish; border entire; spores ellipsoid-fusiform, usually 3-septate.—*Nyl. Synops. Lich.* 109.

**Auckland**, *Knight (Mitten)*. (Europe.)

6. **C. contiguum**, *Knight and Mitt. in Linn. Trans.* 23. 106. *t.* 12. *f.* 35. Thallus dull green, black when dry; lobes tufted, complicate. Apothecia small, crowded, marginal, pale brown; spores ellipsoid, multilocular.

**Northern** Island: Auckland, on wood, *Knight*.

### 3. LEPTOGIUM, Acharius.

Thallus as in *Collema*, but usually thinner, all cellular or with a cellular cortical layer. Apothecia with a thalline border, which is concolorous with, or paler than, the surface of the disc; spores in eights, ovoid or ellipsoid, variously septate or divided.

A genus with the habit, etc., of *Collema*, which it closely resembles. The species are very difficult of discrimination.

1. **L. Scoticum**, *Fries*;—*Bab. in Fl. N. Z.* ii. 308. Thallus membranous, brown, laciniately lobed, plaited; lobes rounded. Apothecia small, rather concave, same colour as the thallus; spores ovoid.—*Nyland. Synops. Lich.* 123.

**Northern Island**, *Colenso*. (Europe, N. Africa.)

2. **L. tremelloides**, *Fries*;—*Bab. in Fl. N. Z.* ii. 308. Thallus lead-coloured or somewhat olivaceous, glaucous, membranous, lobed; lobes sometimes imbricate or crisped. Apothecia red, usually elevate; spores ovoid or ellipsoid, 3-septate, narrowed at both ends.—*Nyland. Synops. Lich.* 124.

Common throughout the **Northern** and **Middle** Islands. (Cosmopolite.)

3. **L. Saturninum**, *Nyland.*—*Collema*, *Bab. in Fl. N. Z.* ii. 309. Thallus large, leaden-brown or greenish, lobed, or polyphyllous and complicate; lobes sinuate, often furfuraceous, cinereous, pubescent below. Apothecia dirty brown, flat, almost shining; border entire, cupulate; spores ellipsoid, 3-septate.—*Nyland. Synops. Lich.* 127.

**Northern Island**, *Colenso*. (Europe.)—*Babington* identifies this with an Antarctic, S. African, American, and Indian species, no doubt including *L. Menziesii*, *Montagne*, and *L. Hildenbrandii*, *Nyl.*, under it; but *Nylander* separates these latter, by (confessedly) very slight characters.

4. **L. chloromelum**, *Nyland.*—*L. Brebissonii*? *Bab. in Fl. N. Z.* ii. 307. Thallus lead-coloured and somewhat greenish, membranous, lobed, plaited longitudinally, very rugose; lobes waved. Apothecia red or red-brown, plane or concave; border thick, rugose and plaited, or granulate; spores 3–5-septate, ellipsoid or narrowed at both ends.—*Nyland. Synops. Lich.* 128. *C. rugatum*, *Tayl.*

**Northern Island**: Bay of Islands, on trees, *J. D. H.*, etc. (Europe, America, India.)

5. **L. bullatum**, *Nyland.* Thallus lead-coloured, opaque, closely rugulose, membranous, lobed and incised, wrinkles narrow acute undulate. Apothecia dull red, flat or tumid; border thick, rugulose, bullate, often urceolate; spores ellipsoid, 5-septate, narrowed at both ends.—*Nyland. Synops. Lich.* 129.

**New Zealand**, (*Nylander*). (Tropical Asia and America.)

#### 4. CALICIUM, *Acharius*.

Thallus granular, powdery or evanescent, very rarely scaly or obsolete. Apothecia black, stipitate, rarely sessile, in turbinate capitula, globose. Spores brown or blackish, simple or septate.

Minute, often microscopic Lichens, found on rocks and old wood.

1. **C. curtium**, *Borrer*;—*Bab. in Fl. N. Z.* ii. 304. Thallus granular, cinereous or obsolete. Apothecia black; stipes often stout; capitulum cylindrical-turbinate; margin white; mass of spores black; spores ellipsoid, black, 1-septate.—*Nyland. Synops. Lich.* 156.

**Northern Island**: on dead wood, *Colenso*. (Europe, N. America, N. Asia.)—A very minute plant, belonging to a genus of which the species are most difficult of discrimination.

5. **SPHÆROPHORON**, Persoon.

Thallus branched, tufted, shrubby, fragile, cylindric, compressed, flattened or more or less scale-like; branchlets dilated at the tips. Apothecia near the tips of the frond, terminal or on the under surface, bursting irregularly, covered with a deciduous black layer of pigment; spores black or dark violet, spherical.

A genus of 4 species, found on rocks and old wood in temperate climates.

1. **S. compressum**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 304. *t.* 130.—*S. australe*, *Laur.* Thallus foliaceous, glaucous, blackish at the base, white below, much dilated above and palmately lobed; edges erose. Apothecia very large, with a broad flat thalline border, which is lacerate and scrobiculate or crested.—*Nyland. Synops. Lich.* 170.

**Northern** and **Middle** Islands: abundant on the ground and stumps of trees, and **Lord Auckland's** and **Campbell's** Islands. (Australia, S. Africa, N. and S. America.)

2. **S. coralloides**, *Pers.*;—*Bab. in Fl. N. Z.* ii. 307. Thallus terete, pale or white, sometimes lurid, branched. Apothecia small, on globose receptacles, irregularly dehiscing above.—*Nyland. Synops. Lich.* 171.

**Northern** and **Middle** Islands, *Colenso*, etc., on rocks, etc. **Lord Auckland's** group, *J. D. H.* (Temperate and cold regions of both hemispheres.)

3. **S. tenerum**, *Laur.*;—*Bab. in Fl. N. Z.* ii. 304; *Fl. Antarct. t.* 197. *f.* 1. Thallus terete, slender, excessively branched, pale or white; branches dense, slender, intricate. Apothecia on the primary branches, small, the border deciduous, having a black capitulum girt by a circular rim.—*Nyland. Synops. Lich.* 171. *S. curtum*, *Hook. f. and Tayl. in Lond. Journ. Bot.* iii. 654.

Abundant throughout the islands and in **Lord Auckland's** group and **Campbell's** Island. (Chili, Antarctic Islands.)

6. **BÆOMYCES**, Persoon.

Thallus horizontally expanded, crustaceous, scaly powdery or granular. Apothecia sessile or stipitate, pale pink or flesh-coloured or dirty-white, without a thalline border; stipes consisting of longitudinal filaments; spores 1–3-septate. Spermatogonia furnished with arthrostigmata.

A genus of some 17 species, found in various temperate climates on the ground, rotten wood, etc.

1. **B. rufus**, *DC.*;—*Bab. in Fl. N. Z.* ii. 298. Thallus greenish whitish or glaucous, thin, effuse, granular; granules sometimes depressed. Apothecia on long or short white stalks, flesh-coloured, convex; spores simple, ellipsoid-oblong.—*Nyland. Synops. Lich.* 176. *Biatora byssoides*, *Fries*; *Bab. l. c.* 299.

**Northern** Island: common on banks, etc., *J. D. H.*, etc. (Europe, America, Australia.)

2. **B. roseus**, *Persoon*;—*Bab. in Fl. N. Z.* ii. 298. Thallus white, granular, crustaceous. Apothecia pale, flesh-coloured or rosy, subglobose; stipes whitish; spores fusiform or oblong-fusiform, simple.—*Nyland. Synops. Lich.* 179.

**Northern** Island, *Colenso*. (Europe, America.)

7. **CLADONIA**, Hoffmann.

Thallus of horizontal scales, giving off erect tubular or laciniate podetia, or shrubby or tufted, and formed of erect podetia, which are often branched or smooth, scaly or granular and sometimes perforated, often dilated at the apex into conical cups. Apothecia terminal on the podetia or its lobes, convex, without thalline border, scarlet red-brown or whitish, rarely blackish; spores small, oblong, simple. Spermatogonia with simple or sparingly branched sterigmata.

A very large genus of Lichens, most abundant on alpine and subalpine moorlands; a few species occur on old wood in damp forests.

§ 1. *Apothecia pale or brown.**a. Thallus foliaceous, lacinate. Podetia bearing cups.*

1. **C. pyxidata**, *Fries*;—*Bab. in Fl. N. Z.* ii. 297. Thallus ashy-grey, glaucous or greenish, scaly below or naked; podetia often scaly or partially powdery or furfuraceous; cups cyathiform, well developed. Apothecia pale brown or reddish; spores oblong.—*Nyland. Synops. Lich.* 193.

**Northern and Middle Islands and Lord Auckland's group:** common. (Cosmopolite.)

2. **C. fimbriata**, *Hoffm.*;—*Bab. in Fl. N. Z.* ii. 297. Thallus as in *B. pyxidata*, but podetia white or glaucous, altogether powdery, and the cups usually narrower.—*Nyland. Synops. Lich.* 194.

**Northern and Middle Islands:** common. (Cosmopolite.)

3. **C. gracilis**, *Hoffm.*;—*Bab. in Fl. N. Z.* ii. 297. Thallus ashy, pale or greenish, with scaly leaflets below or naked; podetia elongate, corticate, smooth, subulate or bearing cups. Apothecia sessile or stalked, brown or reddish; spores oblong.—*Nyland. Synops. Lich.* 196. *C. verticillata*, *Flærke*; *Bab. in Fl. N. Z.* ii. 296. *C. sarmentosa*, *Hook. f. and Tayl. in Lond. Journ. Bot.* iii. 651.

**Northern and Middle Islands and Lord Auckland's group:** common. (Cosmopolite chiefly in cold regions.)

4. **C. decorticata**, *Fries*;—*Bab. in Fl. N. Z.* ii. 298. Thallus with close-set glaucous scales, which cover the podetia; lowest scales broad, crenate, white or blackish below; podetia cylindric, without cups or with narrow ones. Apothecia brown, usually numerous and confluent; spores oblong.—*Nyland. Synops. Lich.* 199.

**Northern Island:** on wood, *Colenso*. (Europe.)—I find no specimens in the Herbarium, and *Nylander* gives no southern habitat.

5. **C. cariosa**, *Flærke*.—*C. degenerans*, *Flærke*;—*Bab. in Fl. N. Z.* ii. 279. Thallus cinereous, glaucous, with crenate scales at the base; podetia naked below, above white granular warted and cancellate; cups unequally digitately parted; divisions fastigiate. Apothecia brown, turgid, large; spores oblong.—*Nyland. Synops. Lich.* 194.

**Northern and Middle Islands:** Bay of Islands, *Colenso*, to Otago, *Lindsay*. (Cosmopolite.)

*b. Cups none. Podetia imperforate, except sometimes at the arils.*

6. **C. furcata**, *Hoffm.*;—*Bab. in Fl. N. Z.* ii. 296. Thallus scaly or



naked at the base; podetia pale green white or brownish, smooth, branched; axils not perforate; branches subulate, fertile often fastigiate; cups 0. Apothecia brown or rufous, small; spores oblong.—Nyland. Synops. Lich. 206.

**Northern** and **Middle** Islands: common. **Kermadec** Islands, *Milne*. (Cosmopolite.)

7. **C. squamosa**, *Hoffm.*;—*Bab. in Fl. N. Z.* ii. 296. Thallus horizontal, subfoliaceous; scales crenate; podetia white, furfuraceous or scaly, branched; axils pervious, toothed and proliferous; tips forked; fertile crested, subcorymbose; cups 0. Apothecia pale or red brown.—Nyland. Synops. Lich. 209.

**Northern** Island, *Colenso*, *Jolliffe*. (Cosmopolite.)

8. **C. rangiferina**, *Hoffm.*;—*Bab. in Fl. N. Z.* ii. 296. Thallus erect, leafless and scaleless; podetia densely tufted, ashy-white, often brown at the tips, smooth, slender, elongate, branched; axils perforate; branches short, spreading or decurved; branchlets subradiate, fertile suberect subcorymbose; cups 0. Apothecia small, brown or pale; spores oblong-fusiform.—Nyland. Synops. Lich. 211.

Abundant throughout the **Northern** and **Middle** islands, **Lord Auckland's** group, **Campbell's** and **Chatham** Islands. (Cosmopolite).—One of the most common of Lichens in cold and temperate latitudes, often forming extended white patches, 2-4 in. high. The food of the reindeer in arctic regions.

9. **C. capitellata**, *Bab. in Fl. N. Z.* ii. 296. t. 130 B. Thallus leafless or with few scales; podetia white or straw-coloured, slender, smooth, straight, subulate, sparingly branched; tips pungent, brown; axils perforate, gaping; cups 0. Apothecia shortly stipitate; disk brown, reflexed, sometimes perforate in age.—*Cenomyce capillata*, *Tayl. in Lond. Journ. Bot.*

**Northern** and **Middle** Islands: not uncommon, *Colenso*, etc. (Tasmania).—Nylander (*Synops. Lich.* 216) refers this very doubtfully to *C. amaurocraea*, from which, however, as he observes, it seems to differ essentially in the absence of cups and perforate axils.

β. Cups 0. Podetia naked, perforate at the sides, not at the axils.

10. **C. aggregata**, *Eschweiler*;—*Bab. in Fl. N. Z.* ii. 295. Thallus pale brown or dirty yellow, darker below, of erect, densely tufted, smooth, glabrous, shining, rigid, slender or stout branched podetia; sterile branches forked, with subulate tips; fertile stouter, turgid. Apothecia minute, blackish, crowded; spores oblong.—Nyland. Synops. Lich. 218. *Dufourea colodotes*, *Tayl. in Lond. Journ. Bot.* iii. 650. *Cenomyce*, *Fl. Antarct.* t. 80. f. 2.

Abundant throughout the islands to **Campbell's** Island, forming large patches on rocks, trees, etc. (Mountains of West Indies, S. America, S. Africa, and S. Asia, also S. Australia.)

11. **C. retipora**, *Flerke*;—*Bab. in Fl. N. Z.* ii. 295. Habit of *C. aggregata*, but the podetia forming a most beautifully reticulated open network, white or pale yellow; branchlets obtuse.—Nyland. Synops. Lich. 219.

**Northern** and **Middle** Islands, and as far south as **Campbell's** Island, forming large tufts on the ground. (Australia, Tasmania).—A most beautiful Lichen.

§ 2. Apothecia scarlet.

12. **C. cornucopiodes**, *Fries*;—*Bab. in Fl. N. Z.* ii. 298. Thallus yellow, white, scaly below; scales lobed, crenate or incised; podetia smooth

or granular; cups often proliferous. Apothecia bright scarlet, often confluent.—Nyland. Synops. Lich. 220.

**Northern** Island: on the mountains, *Colenso*. **Middle** Island: probably common; Mount Brewster, *Haast*. (Cosmopolite in temperate and frigid regions.)

13. ***C. digitata***, *Hoffm.*;—*Bab. in Fl. N. Z.* ii. 298. Thallus leafy below; leaflets pale green above, whitish and powdery below, lobed or crenate; podetia white, powdery, naked, cylindric, simple or branched; cups narrow or broad; margins entire toothed or digitate. Apothecia scarlet, solitary or confluent.—Nyland. Synops. Lich. 223.

**Northern** Island, *Cunningham*, *Colenso*, etc. (Europe, N. America, N. Asia, Tasmania.)

14. ***C. macilenta***, *Hoffm.*;—*Bab. in Fl. N. Z.* ii. 298. Thallus with pale green crenate or incised leaflets or scales at the base; podetia cylindric, white, powdery or granular, slender, simple or divided, obtuse; cups 0 or narrow. Apothecia scarlet, confluent, tubercled.—Nyland. Synops. Lich. 223.

**Northern** Island, *Cunningham*, etc. (Cosmopolite.)

*C. uncialis* is enumerated by Montagne as a native of Lord Auckland's group, but not by Nylander, and we have seen no specimens.

## 8. STEREOCAULON, Schreber.

Thallus usually tufted, formed of solid podetia, with a medullary axis, shrubby, fragile, granular and usually fibrillose, sometimes also bearing cephalodia (globular bodies) on the surface. Apothecia brown, terminal or lateral, without or rarely with a thalline border; spores 8 in an ascus, cylindric-fusiform, septate. Spermatogonia mixed with straight or curved subacicular spermatia.

A considerable genus, natives of cold moorlands and rocks, rarely of trunks of trees and dead wood.

1. ***S. Colensoi***, *Bab. in Fl. N. Z.* ii. 295. t. 130 A. Podetia 1–2 in. high, stout, white, reddish below, rugulose, sparingly branched; branches often spreading, tufted and fibrillose below, naked above; cephalodia 0. Apothecia flat, black, terminal, with a thalline border.—Nyland. Synops. Lich. 232.

**Northern** Island: on rocks, *Colenso*.

2. ***S. ramulosum***, *Ach.*;—*Bab. in Fl. N. Z.* ii. 295. Podetia 3–5 in. high, stout, erect, with long branches, granular and with simple or divided fibrils, also bearing spherical pedicellate pale cephalodia. Apothecia terminal, pale or brown, without a thalline border.—Nyland. Synops. Lich. 235; *Fl. Antarct.* t. 80. f. 1; *A. Rich. Voy. Astrolabe*, t. 9. f. 4.

Abundant throughout the **Northern** and **Middle** Islands, **Lord Auckland's** group, and **Campbell's** Island. (S. America, Australia, Tasmania.)

3. ***S. corticulatum***, *Nyland.* Podetia small, short, tufted, branched, firm, erect, compressed, areolate on the surface, granular, powdery above; cephalodia subsessile. Apothecia brown, flat or convex, terminal, without a thalline border.—Nyland. Synops. Lich. 241.

**Northern** and **Middle** Islands : on calcareous rocks, *Colenso* ; Otago, *Lindsay*.

*S. denudatum*, Flörke, is enumerated by Babington in the 'New Zealand Flora' (vol. ii. p. 295), but barren. I find no New Zealand specimens in the Herbarium, and Nylander does not allude to it as a native of the islands. *S. corticatum*, Nyland., is indicated in Lindsay's list of Otago Lichens.

### 9. ARGOPSIS, Theodore Fries.

Thallus as in *Stereocaulon*, but glabrous, or with few scattered fibrils and granules. Apothecia black, peltate, terminal, dilated, with a delicate thalline margin ; spores solitary in the asci, large, murally divided.

A genus of one species, and that a very handsome plant, which Babington suspects may prove to be a form of *Stereocaulon ramulosum*.

1. **A. megalospora**, *Theodore Fries*.—*Stereocaulon Argus*, Fl. Antarct. 196. t. 79. f. 2. 1-4. Thallus 1-3 in. high, whitish, stout.—Nyland. Synops. Lich. 254.

**Campbell's** Island : on rocks, *J. D. H.*

### 10. THAMNOLIA, Acharius.

Thallus consisting of erect or prostrate, cylindric or subcompressed, often flexuose hollow podetia, which are simple or rarely forked, acute, imperforate, white, often rugose. Apothecia unknown. Spermatogonia pale as in *Bæomyces*.

A genus of one common species, found on moors, etc., and 2 doubtful ones.

1. **T. vermicularis**, *Ach.* Thallus chalky-white, 2-4 in. long.—Nyland. Synops. Lich. 265.

**Middle** Island, *Sinclair*, on open heathy places. (Europe, N. Asia, Himalaya, Andes, Australia.)

### 11. USNEA, Hoffm.

Thallus erect and shrubby or pendulous and branched, pale yellow or greenish, terete or angled ; axis solid filiform. Apothecia peltate, with a thalline border, terminal or lateral, concolorous or black. Spermatogonia lateral, with simple sterigmata. Spermatia cylindric acicular.

One of the commonest genera of Lichens in all latitudes.

§ 1. *Apothecia of the same colour as the thallus.*

1. **U. barbata**, *Fries* ;—*Bab. in Fl. N. Z.* ii. 268. Thallus white yellow pale grey or glaucous, erect or pendulous, long or short, stout or slender.—Nyland. Synops. Lich. 267.

Var. *florida*. Thallus white, stout, erect, bristly with spreading close-set fibrils.

Var. *dasygota*. Thallus whitish, elongate, pendulous, fibrillose.

Var. *plicata*. Thallus pendulous, not fibrillose.

Var. *articulata*. Thallus white or yellowish, long, branched, fibrillose or not, jointed or constricted. Apothecia small.

Var. *ceratina*. Thallus erect or pendulous, fibrillose and rough with papillæ.

Var. *trichodea*. Thallus very slender, filiform, pendulous ; branches sparsely fibrillose.

Abundant throughout the **Northern** and **Middle** Islands. **Lord Auckland's** group and **Campbell's** Island : on trees, rocks, etc. (Cosmopolite.)

2. **U. angulata**, Ach.;—*Bab. in Fl. N. Z.* ii. 269. Thallus as in *U. barbata*, var. *dasygoga*, but stems and branches angular and scabrous.—Nyland. Synops. Lich. 272.

**Northern** Island, *J. D. H.*, barren. (Australia, Madagascar, S. America.)

§ 2. NEUROPOGON, *Nees and Flotow*.—*Apothecia black*.

3. **U. melaxantha**, Ach.;—*Bab. in Fl. N. Z.* ii. 369. Thallus erect-straw-coloured or orange-yellow, often banded with black, rigid, dichotomously branched; tops of branches slender, black, smooth or rough. Apothecia large, black.—*Neuropogon*, Nyland. Synops. Lich. 272.

Lofty mountains of the **Northern** and **Middle** Islands, *Colenso*, etc. (Arctic and antarctic regions, Andes and Alps of Tasmania.)

## 12. ALECTORIA, Ach.

Thallus terete or compressed, erect or pendulous, filiform, intricately branched; axis hollow or spongy. Apothecia usually dark-coloured, with a thalline border; paraphyses not separating; spores ellipsoid. Spermatogonia with acicular spermatia.

A small temperate, alpine, and arctic genus.

1. **A. ochroleuca**, *Nyland*.—*Evernia*, *Fries*;—*Bab. in Fl. N. Z.* ii. 269. Thallus erect or prostrate, rigid, terete or compressed, smooth or lacinate; branches often black at the tips. Apothecia rufous or brown, nearly terminal on the subulate top of the branch, sticking out at one side of it.—*Nyland*. Synops. Lich. 281.

**Northern** and **Middle** Islands, *Colenso*, *Bidwill*, etc. (Australia, Bourbon, N. hemisphere generally.)

## 13. RAMALINA, Ach.

Thallus erect or pendulous, tufted, white or pale, compressed or leafy, lacinate, the two surfaces alike. Apothecia scattered or marginal, pale, with a thalline border; spores oblong, 1-septate, usually curved; paraphyses separate. Spermatogonia with branched filaments; sterigmata with few articulations; spermatia cylindric.

A considerable genus, found in all latitudes.

1. **R. calicaris**, *Fries*;—*Bab. in Fl. N. Z.* ii. 270. Thallus yellow-white, rigid, compressed, linear, laciniöse, unequally divided, often channelled, never rigid and cartilaginous. Apothecia subterminal, plane.—*Nyland*. Synops. Lich. 294.

Var. *farinea*. Thallus with long broad laciniae. Apothecia shortly pedicelled, marginal or lateral.

Var. *fastigiata*. Thallus smaller; laciniae compressed or terete, subfastigate. Apothecia subterminal or terminal.

Var. *farinacea*. Thallus covered with soredia.

Var. *Eckloni* (var. *membranacea*, *Fl. N. Z.* ii. 270). Thallus glabrous, membranous. Apothecia small.

Var. *linearis* (*R. linearis*, Ach.;—*Fl. N. Z.* ii. 270). Thallus small, narrow, flat, glabrous.

Var. *pusilla*. Thallus short, fastigate, subterete, inflated; branches obtuse. Apothecia terminal.—*R. inflata*, *Hook. f. Fl. Antarct.* 194. t. 79. f. 1.



Throughout the **Northern** and **Middle** Islands abundant. Var. *pusilla*, **Lord Auckland's** group, on maritime rocks. (Cosmopolite.)

2. **R. scopulorum**, *Ach.*! Thallus pale, shining, excessively variable in stature and branching, terete or compressed, rigid and cartilaginous. Apothecia subpedicelled, subterminal or lateral.—Nyland. Synops. Lich. 292.

**Northern** Island, *Jolliffe*. (Cosmopolite.)

3. **R. usneoides**, *Fries*;—*Bab. in Fl. N. Z.* ii. 270. Thallus pale, compressed, elongate, flaccid, linear, excessively branched, and as it were longitudinally nerved, often twisted. Apothecia marginal.—Nyland. Synops. Lich. 291.

**Northern** Island, *J. D. H.*

#### 14. PLATYSMA, Hoffmann.

Thallus rigid, shrubby or dilated, lobed or prostrate, erect or ascending, laciniate, rarely fistular, with a spongy axis. Apothecia marginal, with a thalline border, reddish-brown or dark; spores small, simple; paraphyses not separating. Spermatogonia marginal, enclosed in spiculæ or tubercles or papillæ; spermatia various.

A considerable temperate, alpine, and Arctic genus.

1. **P. sæpincola**, *Hoffm.*—*Cetraria*, *Ach.*;—*Bab. in Fl. N. Z.* ii. 271. Thallus chesnut-brown or dark olive-brown, prostrate,  $\frac{1}{2}$ –2 in. broad; laciniae prostrate or ascending, smooth or laciniate, sinuate or crenate, paler below. Apothecia brown, rugulose beneath; border entire.

**Auckland**, *Sinclair*. Specimens imperfect and doubtful. (Northern hemisphere, Fuegia.)

*Platysma glaucum* and *Cetraria aculeata*, *Fries*, are enumerated by A. Richard amongst the Lichens brought by D'Urville from New Zealand, but I have seen no specimens, and Nylander does not give the islands as a habitat. They are abundant northern plants, also occurring in Fuegia.

#### 15. NEPHROMA, Ach.

Thallus foliaceous, prostrate, dilated, upper surface shining, under soft, without veins. Apothecia adnate to the lower recurved margin of the thallus, peltate; spores 3-septate. Spermatogonia marginal.

A small arctic and antarctic genus, rarer in the cold, temperate, and alpine regions.

• § 1. *Thallus, when cut across, showing a green stratum of separate granules.*

1. **N. australe**, *A. Rich.*;—*Bab. in Fl. N. Z.* ii. 371. Thallus whitish or straw-coloured, 2–4 in. broad, smooth, laciniate and lobed, sinuate, reddish here and there; beneath smooth, white or straw-coloured. Apothecia small, red-brown.—Nyland. Synops. Lich. 318. *N. pallens*, Nyland. Enum. Lich. 101.

**Northern** and **Middle** Islands: common, *D'Urville*, etc. (Tasmania.)—This is probably the *N. antarcticum*, Jacq., of Lindsay's 'Enumeration of Otago Lichens.'

2. **N. schizocarpum**, *Nyland.*—*N. resupinatum*, var. *pruinosa*, Mont.;—*Bab. in Fl. N. Z.* ii. 272. Thallus 2–3 in. broad, livid-brown, smooth,

lobed, crenate; below smooth, of the same colour, with pale margins or altogether pale. Apothecia reddish, longitudinally divided.—Nyland. Synops. Lich. 318.

**Banks's Peninsula, Hombron**, on bark.

§ 2. *NEPHROMIUM*, Nylander.—*Stratum of green granules in moniliform filaments.*

3. ***N. lævigatum***, Ach.—*N. resupinatum*, var. *rufum*, Bab. in Fl. N. Z. ii. 272. Thallus livid, chesnut-brown, lobed or laciniate, toothed and imbricate, pale and glabrous below. Apothecia red-brown, border crenulate and fimbriate.—*Nephromium*, Nyland. Synops. Lich. 320.

**Northern and Middle Islands, Colenso and Lyall.** (Europe, N. America, Chili, S. Africa, Java.)

4. ***N. cellulosum***, Ach. Thallus livid, chesnut-brown, reticulately foveolate and laciniate, 2–4 in. broad, lobed, beneath white, glabrous and bullate. Apothecia rufous.—*Nephromium*, Nyland. Synops. Lich. 321.

**New Zealand**, (Nylander.) (Tasmania, Fuegia, Juan Fernandez.)

5. ***N. Lyallii***, Bab. in Fl. N. Z. ii. 272. t. 127 A. Thallus livid, brown, with a broad bluish margin, membranous, shining beneath, pale and rugulose; lobes laciniate. Apothecia pale red, with toothed fimbriate margins.—*Nephromium*, Nyland. Synops. Lich. 322.

**Northern Island, Colenso. Middle Island, Lyall.**

## 16. *PELTIGERA*, Ach.

Thallus prostrate, dilated, foliaceous, membranous, fragile, lobed, upper surface often shining, under spongy, with broad veins. Apothecia marginal on the upper surface of the lobes of the frond.

A genus of about 8 alpine arctic and temperate Lichens, unknown in tropical climates.

1. ***P. rufescens***, Hoffm.;—Bab. in Fl. N. Z. ii. 324. Thallus small; pale reddish or ashy; margin crisped beneath, pale below, with white rootlets; veins often obscure or brown.—Nyland. Synops. Lich. 325.

Var. *spuria*. *P. canina*, var. *spuria*, Bab. in Fl. N. Z. ii. 324.—Thallus digitately lobed.

Common throughout the **Northern and Middle** islands. (Cosmopolite.)

2. ***P. polydactyla***, Hoffm.;—Bab. in Fl. N. Z. ii. 324. Thallus pale, livid brown or glaucous, shining, smooth or impressed; beneath white, reticulated with brown nerves; fertile lobes narrow. Apothecia on ascending prolonged lobes.—Nyland. Synops. Lich. 326.

Throughout the **Northern and Middle** islands, and in **Campbell's Island**. (Cosmopolite.)

## 17. *STICTA*, Ach.

Thallus prostrate, spreading from a centre, foliaceous, lobed or laciniate, often very large, leathery, membranous or brittle; upper surface shining or smooth, often bearing soredia; white yellow or green internally; lower surface spongy or fibrous, rarely smooth, usually furnished with white or yellow

cyphellæ (powdery or smooth, white or yellow warts or cups). Apothecia superficial, with a thalline border; paraphyses separate; spores fusiform, usually 1-3-septate. Spermatogonia scattered, scarcely protruding, with arthrosterigmata.

A very large genus, temperate and tropical, not arctic nor alpine, most abundant in New Zealand on the ground and trees.

§ 1. *STICTINA*, Nylander.—*Stratum of granules blue-green or glaucous-green; granules without a cellular membrane.*

*a. Cyphellæ minute, pulverulent, white.*

1. **S. argyracea**, Delise;—*Bab. in Fl. N. Z.* ii. 281. Thallus reddish or pale brown, 3-10 in. broad, smooth, lacinate; laciniae linear, subpinnatifid, fracture white, upper surface with scattered white soredia, beneath whitish or yellowish, tomentose. Apothecia small, red-brown, marginal or submarginal; thalline border entire.—*S. aspera*, Lam. *Stictina*, Nyland. Synops. Lich. 334.

**Northern** and **Middle** Islands, *Colenso*, etc. (Madagascar, Java, India, S. Africa, Polynesia.)

2. **S. fragillima**, *Bab. in Fl. N. Z.* ii. 279, *excl. var. β*. Thallus yellowish or glaucous, thin, rigid, fragile, smooth or rough here and there, fracture white; laciniae linear, pinnatifid, dichotomous; beneath ochraceous, subcostate, tomentose. Apothecia reddish or brown, scattered; thalline border toothed or crenulate.—*Stictina*, Nyland. Synops. Lich. 337.

**Northern** Island, *Dieffenbach*, etc. (Australia, Tasmania, Peru.)—Nylander excludes *var. glaberrima*, *Bab.*, which has urceolate cyphellæ, and may be referable to *S. cinnamomea*, A. Rich. (see remarks at end of genus).

3. **S. Hookeri**, *Bab. in Fl. N. Z.* ii. 282. *t.* 125 B. Thallus lurid, æneous or glaucous or brownish, 3-4 in. broad, rigid, scarcely shining, serobiculate; lobes broad, rounded, crenate, with minute furfuraceous tubercles on the costæ and margin, brownish below or blackish, with pale papilliform cyphellæ. Apothecia black, scattered; thalline border entire.—*Stictina*, Nyland. Synops. Lich. 336.

**Northern** Island: Bay of Islands, etc., *Colenso*, etc.

*β. Cyphellæ minute, pulverulent, yellow.*

4. **S. crocata**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 275. Thallus lurid, brownish, 3-5 in. broad, opaque or shining, fracture white, broadly lobed; lobes crenate, serobiculate, sometimes reticulately costate, with orange-yellow soredia; beneath brown or black. Apothecia scattered; thalline border crenate.—*Stictina*, Nyland. Synops. Lich. 338.

Common throughout the **Northern** and **Middle** islands. (Cosmopolite in temperate and warm damp climates.)

5. **S. carpoloma**, *Delise*;—*Bab. in Fl. N. Z.* ii. 276. *t.* 126. Thallus glaucous, yellowish or ashy, 3-5 in. broad, rigid, almost shining; laciniae linear, with narrow retuse lobes, often serobiculate; fracture white; beneath brown or pale, with small yellow cyphellæ. Apothecia black, marginal thalline border smooth.—*Stictina*, Nyland. Synops. Lich. 339.

Var. *granulata*.—*S. granulata*, Bab. l. c. 281. Thallus thicker, ashy-white; cyphellæ sometimes white.—*Stictina*, Nyland. l. c. 340.

**Northern** and **Middle** Islands: not uncommon. (Bourbon, Java, Polynesia, Tasmania, Chili, Fuegia.)

γ. *Cyphellæ urceolate*.

6. **S. filicina**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 276. Thallus pale yellowish, smooth, more or less stipitate, incised and lobed; lobes costate below at the base or down the middle; margin sinuous; beneath pale ochreous, tomentum thin or 0. Apothecia reddish or brown, scattered; thalline border entire or crenulate.—*Stictina*, Nyland. Synops. Lich. 349.

Var. *latifrons*. Thallus larger, brownish, stipitate.—*S. latifrons*, A. Rich. Fl. N. Z. 27. t. 8. f. 2; Bab. in Fl. N. Z. ii. 277.

Var. *Menziesii*. Thallus thick, orbicular, more stipitate, brown or blackish below.—*S. Menziesii*, Fl. Antart. 198. *S. latifrons*, var. *Menziesii*, Fl. N. Z. ii. 277. t. 122.

Common throughout the **Northern** and **Middle** islands, in alpine and more southern localities. **Lord Auckland's** group, *J. D. H.* (S. America, Java, Tasmania.)

§ 2. *STICTA*, *Nylander*.—*Stratum of granules green or yellow-green; granules with a cellular membrane.*

α. *Cyphellæ urceolate, white.*

7. **S. damæcornis**, *Ach.* Thallus 4–6 in. broad, lurid or pale red-brown, more or less shining, smooth; laciniae linear, pinnatifid, dichotomous; lobes obtuse; beneath ochraceous or blackish, tomentum often sparse or 0. Apothecia red-brown; thalline border entire or crenulate.—*Nyland. Synops. Lich.* 357.

Var. *sinuosa*. Thallus pale, appressed, more sinuate, pinnatifid; lobes often broader.—*S. sinuosa*, Pers.;—*Bab. in Fl. N. Z.* ii. 280.

Var. *macrophylla*. Thallus thicker, darker; lobes broader.

Common throughout the **Northern** and **Middle** islands. (S. America, S. Africa, Java, Polynesia, Australia.)

8. **S. variabilis**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 280. Thallus 3–6 in. broad, pale glaucous or brownish, membranous, rather rigid; laciniae sub-pinnatifid; margin sinuate-crenulate, deflected; beneath brown, with pale margins, tomentose. Apothecia red-brown, marginal or submarginal; thalline border crenulate.—*Nyland. Synops. Lich.* 357.

**Northern** and **Middle** Islands: common. **Lord Auckland's** group, (*Montagne*.) (Mauritius, Polynesia, Australia.)

9. **S. cinereo-glauca**, *Tayl.*;—*Bab. in Fl. N. Z.* ii. 283. t. 127. f. C. Thallus ashy or glaucous, about 3 in. broad, scarcely shining, lobed; lobes crowded, sinuate, crenate or repand, smooth; beneath pale, with whitish tomentum. Apothecia small, reddish; thalline border obsolete or crenulate.—*Nyland. Synops. Lich.* 358.

**Northern** Island, *Colenso*, etc.

β. *Cyphellæ punctiform, orange-yellow.*

10. **S. orygmæa**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 274. Thallus 3–8 in. broad, yellowish or pale livid and glaucous, membranous or rigid, almost shining; fracture bright yellow, unequally closely scrobiculate or reticulately costate; lobes rounded, with large unequal crenatures, internally yellow,



beneath ochraceous, tomentose. Apothecia dark brown or black, glabrous below; thalline border crenulate.—Nyland. Synops. Lich. 361; Mont. in Voy. au Pôle Sud, t. 15.

Abundant throughout the **Northern** and **Middle** Islands, and in **Lord Auckland's** group and **Campbell's** Island. (Tasmania, Fuegia.)

11. **S. Urvillei**, *Delise*;—*Bab. in Fl. N. Z.* ii. 273. Thallus very similar to *S. orygmæa*. Apothecia with a thick rugose border.—Nyland. Synops. Lich. 360. *S. endochrysa*, Fl. Antaret. t. 195. f. 2, not of Delise.

Var. *Colensoi*, Nylander. Thallus firmer, more scrobiculate, margins granular, or lobulate and sorediferous.

Common throughout the **Northern** and **Middle** Islands. (Tasmania, Fuegia.)

12. **S. aurata**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 273. Thallus glaucous, testaceous or coppery-red, broad, firm, smooth, not pitted, lobed; lobes sinuate; margins often covered with golden powder; fracture golden; beneath blackish-brown, shortly tomentose. Apothecia large, blackish, marginal or submarginal; thalline border usually inflexed.—Nyland. Synops. Lich. 361. *S. angustata*, Delise, Stict. t. 3. f. 2.

Common throughout the **Northern** and **Middle** Islands, rare in fruit. (Cosmopolite.)—A beautiful Lichen.

*γ. Cyphellæ punctiform, white.*

13. **S. fossulata**, *Dufour*,—*S. Richardi*, Mont., and *S. foveolata*, Del.;—*Bab. in Fl. N. Z.* ii. 277, 278. Thallus pale, lurid or glaucous, 5–12 in. broad, scrobiculate, foveolate and transversely reticulate; laciniae linear, subpinnatifid, intricate, retuse; beneath pale or brown, tomentum sometimes evanescent. Apothecia red-brown or black, marginal, flat; thalline border at length excluded.—Nyland. Synops. Lich. 363. *S. Billardieri*, Bab. *S. impressa*, *S. cellulifera*, and *S. linearis*, Fl. Antaret.

Var. *β. physciospora*, Nylander. Spores 2-locular, brown.

Throughout the **Northern** and **Middle** Islands, abundant, and in **Lord Auckland's** group and **Campbell's** Island.—Var. *β.* in **Lord Auckland's** group, *J. D. H.*, and Otago, *Lindsay*. (Australia, Tasmania, Chili.)

14. **S. Freycinetii**, *Delise*;—*Bab. in Fl. N. Z.* ii. 280. Thallus pale, usually ochraceous, 5–10 in. broad, scarcely rigid or shining, smooth or obsoletely rugose, laciniately lobed; lobes sinuate, crenate; margins often fringed with white soredia; beneath brown or ashy, tomentose. Apothecia red; thalline border inflexed when young, fimbriate or crenulate when mature.—Nyland. Synops. Lich. 365; Fl. Antaret. t. 196. *S. glaber*, Hook. f. and Tayl.

Abundant throughout the **Northern** and **Middle** Islands, and in **Lord Auckland's** group and **Campbell's** Island. (Australia, Tasmania, Chili, Fuegia.)

Besides the above, various other *Stictæ* are enumerated in the 'New Zealand Flora' which are not confirmed by Nylander, as *S. Mougeotiana*, a tropical species, stated to be found by D'Urville; *S. fuliginosa*, Ach., and *S. limbata*, Ach., both Northern species, to which imperfect specimen of New Zealand plants were referred by Taylor or Babington, with more or less doubt. I do not find in Nylander's Synopsis *S. cinnamomea*, A. Rich. (Fl. N. Z. 28. t. 8. f. 3) doubtfully referred by Babington to *S. fragillima*, *β. glaberrima*.

In Lindsay's enumeration of Otago Lichens, I find the following, which I have not identified:—*S. dissimilis*, Nyland., *fuliginosa*, Dicks., *subcoriacea*, Nyland. n. sp., *dissimulata*, Nyland., and *episticta*, Nyland. n. sp.

### 18. **RICASOLIA**, De Notaris.

Thallus of *Sticta*, but usually without soredia on the upper surface, or cyphellæ on the lower (except *R. coriacea*). Apothecia with a prominent margin. Spermatogonia in prominent mamillæ.

A genus of 14 tropical and temperate Lichens.

1. ***R. coriacea***, Nyland.—*Sticta*, Tayl.;—Bab. in Fl. N. Z. ii. 283. t. 125 A. Thallus pale or lurid yellow, 5–6 in. broad, smooth, with unequal depressions, divided and lobed; lobes lobulate, crenate and pilose; beneath white, tomentose, with white pulverulent cyphellæ. Apothecia rufous, scattered; margin fimbriate.—Nyland. Synops. Lich. 367.

**Northern and Middle Islands**: common, *J. D. H.*, etc.

2. ***R. glomulifera***, De Notaris.—*Sticta*, Del.;—Bab. in Fl. N. Z. ii. 284. Thallus pale, glaucous, 6–12 in. broad, opaque, thickly membranous, smooth or rugose, lacinate; lobes crowded, sinuate-lobulate; beneath pale, with brown or white rootlets. Apothecia rufous or brown; margin entire, usually inflexed.—Nyland. Synops. Lich. 369.

**Northern and Middle Islands**: on bark, *Colenso*; Otago, *Lindsay*. (Europe, America.)

3. ***R. herbacea***, De Notaris.—*Sticta*, Del.;—Bab. in Fl. N. Z. ii. 284. Thallus pale, lurid or glaucous, 6 in. broad and upwards, membranous, shining, smooth or rugulose; lobes crowded, crenate and undulate; beneath pale with white rootlets. Apothecia rufous, large; margin entire or obsoletely crenulate, opaque, obsoletely rugulose.—Nyland. Synops. Lich. 369.

**New Zealand**, *Raoul*. (Europe, America, S. Africa.)

4. ***R. Montagnei***, Nyland.—*Sticta*, Bab. in Fl. N. Z. ii. 284. Thallus glaucous, subrufous, foliaceous, corrugated; lobes rounded, subsinuate, crenate, scaly at the margins; beneath naked, ferruginous or blackish, with a few obsolete white cyphellæ; fracture white. Apothecia free, broad, scattered, often crowded, black; margin deeply inflexed, often lacerate, subserrate and leafy.—Nyland. Synops. Lich. 373.

**Northern and Middle Islands**: on wood, *Sinclair*, *Lyall*.

### 19. **PARMELIA**, Ach.

Thallus spreading from the centre, usually foliaceous, membranous or coriaceous, lacinate or lobed, rarely with terete fistulous lobes; upper surface usually shining; internal substance of matted fibrils; under surface with fibrils. Apothecia with a thalline border, scattered, often shining; paraphyses separate or not separate; spores ellipsoid. Spermatogonia innate; spermatia various.

One of the largest genera of Lichens, found in all latitudes.

§ 1. *PARMELIA*, *Nyland.*—*Paraphyses not separate. Spores simple. Spermatia usually acicular.*

*a. Thallus fibrillous (not densely tomentose) below, rarely glabrous.*

1. ***P. caperata*, Ach.** Thallus orbicular, greenish- or yellowish-white, broad, membranous, often imbricate; lobes lobulate or granulate and crenate, rugulose or granulate here and there; beneath black and hispid. Apothecia scattered, bright chesnut; border elevated and incurved, crenulate and often powdery.—*Nyland. Synops. Lich.* 376.

**Northern and Middle Islands:** on trees, *Colenso*, etc. (Cosmopolite.)

2. ***P. perforata*, Ach.**;—*Bab. in Fl. N. Z.* ii. 285. Thallus orbicular, glaucous-green or white, membranous, naked, deeply lobed and crenulate; margin fringed with black hairs; beneath black and rough. Apothecia red-brown, concave, deep, at length perforated, margin entire.—*Nyland. Synops. Lich.* 377.

**Northern and Middle Islands:** on trees, abundant. **Lord Auckland's group, Le Guillon.** (Cosmopolite.)

3. ***P. perlata*, Ach.**;—*Bab. in Fl. N. Z.* ii. 284. Thallus orbicular, glaucous, with rounded sinuate crenate flattened lobes, often bordered with granules or powdery; beneath black and hairy. Apothecia elevated, olive-brown, concave; margin thin, inflexed.—*Nyland. Synops. Lich.* 379.

Var. *ciliata*. Thallus more naked below; margin ciliated with black hairs. Apothecia more stipitate; margin sorediate.—*P. proboscidia*, *Tayl.*;—*Bab. in Fl. N. Z.* ii. 285.

**Northern and Middle Islands:** on trees, common. (Cosmopolite.)

4. ***P. tiliacea*, Ach.**;—*Bab. in Fl. N. Z.* ii. 285. Thallus orbicular, membranous, grey-glaucous, smooth or rugulose, subpruinose, lobed and sinuate, crenate; beneath brown-black, shaggy. Apothecia brown; margin entire or crenate.—*Nyland. Synops. Lich.* 382.

**Northern Island, Colenso.** (Cosmopolite.)

5. ***P. lævigata*, Ach.** Thallus greyish-white, spreading, smooth, deeply cut into multifid lobes and segments, the ultimate broadly linear, acute, with terminal powdery warts; beneath black and shaggy. Apothecia dark chesnut, concave; margin entire, inflexed.—*Nyland. Synops. Lich.* 384.

Var. *sinuosa*. Thallus yellowish.

**Middle Island:** Otago, on gneiss and basalt (var. *sinuosa*), *Lindsay.* (Europe, etc.)

6. ***P. saxatilis*, Ach.**;—*Bab. in Fl. N. Z.* ii. 285. Thallus orbicular, grey, deeply lobed and sinuate; segments imbricate, retuse, rough with pits and reticulated powdery lines; beneath black and shaggy. Apothecia dark brown; margin inflexed, entire or crenate.—*Nyland. Synops. Lich.* 388.

**Northern and Middle Islands, Colenso;** trap rocks, Otago, *Lindsay.* (Cosmopolite.)

7. ***P. conspersa*, Ach.**;—*Bab. in Fl. N. Z.* ii. 286. Thallus whitish or pale yellow-green, orbicular, membranous, lobed and sinuate, granulate in the centre, and with scattered raised dark points; beneath brown with dark fibres. Apothecia near the centre, dark chesnut; border inflexed, entire or lobed.—*Nyland. Synops. Lich.* 391.

**Northern and Middle Islands:** on stones, common. (Cosmopolite.)

8. **P. olivacea**, Ach.;—*Bab. in Fl. N. Z.* ii. 286. Thallus orbicular, olive-brown, rugged in the centre and often granulated; margin lobed and crenate; lobes appressed; beneath brown and fibrous. Apothecia brown, concave, with an inflexed entire or crenated margin.—*Nyland. Synops. Lich.* 395.—*P. imitatrix*, Tayl.

**Northern** Island: on stones, *Colenso*. **Middle** Island: Otago, on basalt, *Lindsay*. (Almost cosmopolite.)

*β. Thallus glabrous below, inflated at the end.*

9. **P. physodes**, Ach.;—*Bab. in Fl. N. Z.* ii. 286. Thallus orbicular, stellate, glaucous-white; segments sinuate, multifid, convex, glabrous, inflated, often with powdery warts; beneath brown-black. Apothecia reddish-brown; margin thin, elevated.—*Nyland. Synops. Lich.* 401. *P. enteromorphia*, Ach.; *Fl. Antart.* 532.

Common throughout the **Northern** and **Middle** Islands, and in **Lord Auckland's** group and **Campbell's** Island: on bushes and trees. (Cosmopolite.)

10. **P. pertusa**, *Schærer*.—*P. diatrypa*, Ach.;—*Bab. in Fl. N. Z.* ii. 286. Thallus substellate, greenish-grey; segments sinuate, multifid, nearly plane, smooth, with powdery warts; extremities inflated, perforated. Apothecia reddish-brown; margin inflexed, entire.—*Nyland. Synops. Lich.* 402.

**Northern** and **Middle** Islands: on trunks of trees and rocks, common; also in **Lord Auckland's** group, *J. D. H.* (Cosmopolite in temperate regions.)

*γ. Thallus densely tomentose below.*

11. **P. angustata**, *Pers.*—*P. moniliformis*, *Bab. in Fl. N. Z.* ii. 287. t. 127 B. Thallus suborbicular, yellowish and glaucous, covered with black dots, rugose and warted in age, divided almost to the centre into numerous branching narrow lobes, which are repeatedly forked, decumbent, constricted here and there; beneath tomentose with short tufts of crisped fibres, almost spongy. Apothecia large, elevated, free, chestnut-brown, villous below, with crisped hairs; margin entire when young, lobed and crisped in age.—*Nyland. Synops.* 403.

**Northern** Island: on wood, *Colenso*. (Australia, Tasmania.)

§ 2. **PHYSICIA**, *Nyland.*—*Paraphyses separate. Spores rarely simple, usually 2-locular. Sterigmata many, articulate. Spermatia cylindric.*

*α. Thallus yellow, slender, much branched, erect or ascending.*

12. **P. flavicans**, *DC.*—*Evernia*, *Fries.*—*Bab. in Fl. N. Z.* ii. 269. Thallus erect, slender, excessively branched, tufted, tawny, compressed, angular, wavy, warted; branches divaricating, tapering. Apothecia lateral, nearly sessile, flat, orange; border pale, narrow, entire.—*Physcia*, *Nyland. Synops. Lich.* 406. *Borreria*, Ach.

**Northern** Island, *Colenso* (barren); *Nelson, Sinclair*. (Cosmopolite.)

*β. Thallus prostrate.*

13. **P. chrysophthalma**, *DC.*;—*Bab. in Fl. N. Z.* ii. 287. Thallus small, erect or ascending, tufted, branched, bright greenish or whitish-yellow, alike on both sides; branches or segments linear, multifid, fringed. Apo-



thecia abundant, terminal, orange; margin fringed.—*Physcia*, Nyland. Synops. Lich. 410. *Borrera*, Aeh.

**Northern** Island: on branches of trees, *Colenso*, *Knight*. (Cosmopolite.)

*B. Thallus orange-yellow, prostrate.*

14. **P. parietina**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 287. Thallus orbicular, small, bright yellow; lobes marginal, radiating, appressed, rounded, crenate, crisped and granulate in the centre; beneath paler and fibrillose. Apothecia deep orange, concave; margin entire.—*Physcia*, Nyland. Synops. Lich. 410.

**Northern** and **Middle** Islands: common on rocks, wood, bones, etc. (Cosmopolite.)

*γ. Thallus white, free, erect or decumbent, very narrow.*

15. **P. leucomela**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 288. Thallus spreading, smooth, white on both surfaces, linear, channelled and powdery beneath; segments linear, fringed with long black slender hairs. Apothecia scattered, blue-black, with white radiating hairs on the border.—*Physcia*, Nyland. Synops. Lich. 414. *Borrera*, *Ach.*

**Northern** Island: probably common, *Colenso*, *Sinclair*, etc. (Cosmopolite.)

*δ. Thallus horizontally spreading, white or grey.*

16. **P. speciosa**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 288. Thallus stellate, imbricate, greenish-white, somewhat cartilaginous, cut into numerous linear multifid segments, tips obtuse and powdery; beneath snow-white with grey fibres. Apothecia brown, with an inflexed lobed or leafy border.—*Physcia*, Nyland. Synops. Lich. 416.

On stones, wood, mosses, etc., common in the **Northern** Island: *Raoul* Island, *Milne*. (Cosmopolite.)

17. **P. pulverulenta**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 287. Thallus orbicular, stellate, glaucous-green, hoary when dry, cut into numerous oblong multifid flat obtuse wrinkled lobes; beneath black, downy. Apothecia glaucous, black; border thick, inflexed, at length leafy.—*Physcia*, Nyland. Synops. Lich. 419.

**Middle** Island: *Cook's Straits*, *D'Urville*.—I have seen no New Zealand specimens. (Europe and N. America.)

18. **P. stellaris**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 288. Thallus orbicular, stellate, pale grey; segments linear, rather convex, multifid; beneath whitish, with dark fibres. Apothecia grey-black; margin entire, elevated, inflexed.—*Physcia*, Nyland. Synops. Lich. 424.

**Northern** Island: common on bark of trees, *Colenso*, etc. (Cosmopolite.)

19. **P. cæsia**, *Ach.* Thallus as in *stellaris*, but the segments have grey powdery warts in the centre.—*Physcia*, Nyland. Synops. Lich. 426.

**Middle** Island: trap rocks, *Otago*, *Lindsay*. (Europe, N. America.)—I have seen no specimens from New Zealand.

20. **P. obscura**, *Schær.* Thallus as in *P. stellaris*, but livid brown or ashy-brown. Apothecia brownish-black.—*Physcia*, Nyland. Synops. Lich. 427.

**New Zealand.** (*Nylander*.)

21. **P. picta** ?, *Ach.*;—*Bab. in Fl. N. Z.* ii. 288. Thallus (almost of *Placodium*) orbicular, white, appressed; laciniae flat, imbricate, contiguous, imbricate or subconfluent, narrow, crenate; beneath naked, opaque, black, or white at the margins only. Apothecia black, flat, small; margin slightly elevate, crenulate.—*Physcia*, Nyland. Synops. Lich. 430.

**Northern** Island, *Colenso*, barren. (Bourbon, Ceylon, Java, Polynesia.)—A doubtful identification.

Lindsay enumerates amongst his Otago Lichens, *P. Mougeotii*, Schærer, and *P. (Physcia) plinthiza*, Nyland. n. sp.

## 20. UMBILICARIA, Hoffmann.

Thallus membranous or coriaceous, of one peltate lobed lamina, upper and under surfaces opaque. Apothecia without a thalline border, often sinuous or gyrose; paraphyses separate. Spermatogonia with arthrostigmata; spermatia slender, shortly cylindric, obtuse at both ends.

A considerable arctic and alpine genus, of which some species, under the name of "tripe de roche," are used for food by the Canadian hunters when famishing.

1. **U. polyphylla**, *Schrader*. Thallus naked and smooth on both surfaces, dark olive-brown, shining; beneath dark black; margin lobed, simple or many-leaved. Apothecia convex, rough and plaited.—Nyland. Lich. Scand. 119.

**Middle** Island: gneiss rocks, Otago, *Lindsay*. I have seen no specimen. (Europe, Asia, America.)

## 21. PSOROMA, Fries.

Thallus scaly, cellular, granules large, distinct, enclosed in a cellular envelope. Apothecia usually scattered; border crenate; paraphyses separate; spores 8, large, simple. Spermatogonia with arthrostigmata.

A considerable temperate genus.

1. **P. subpruinoseum**, *Nyland*. Thallus broad, leafy, lobed, appressed; border free, sinuate, suberested with granular scales, above reddish-green, woolly on the margins, subsilky beneath. Apothecia with a chesnut-brown disk and subfoliaceous crenulate margin, granular and corrugated beneath.—*P. rubiginosa*, var. *araneosa*, *Bab. in Fl. N. Z.* ii. 289.

**Northern** and **Middle** Islands: on mosses, wood, and rocks, *Colenso*, *J. D. H.*; Otago, *Lindsay*.

2. **P. hypnorum**, *Fries*. Thallus spreading, of small greenish- or yellow-brown scales, which are rounded, crenulate, and often granular on the margin. Apothecia red or brown, flat, with a thin inflexed lobed or crenate border.—Nyland. Lich. Scand. 121.

Var. *coralloideum*, Nyland. Enum. 109.

**Northern** Island, *Colenso*. **Campbell's** Island, *J. D. H.*, var. *corallinum*. (*L. hypnorum* is cosmopolite, the var. *coralloideum* is only known from New Zealand.)

3. **P. sphinctrinum**, *Nyland*.—*Parmelia rubiginosa*,  $\beta$ , *Bab. in Fl. N. Z.* ii. 289. Thallus stellately laciniate, dull red-brown; laciniae sublinear,

inciso-multifid, flattish, scaly, granular and erenulate at the edges; beneath brown, adhering by the whole surface by means of short matted fibrils. Apothecia crowded; thalline border crenulately striate. *Parmelia sphinctrina*, Mont. Voy. au Pôle Sud, t. 15. f. 3.

Common throughout the **Northern** and **Middle** Islands, on rocks, wood, and the ground, and in **Lord Auckland's** group. (Chili, Australia.)—I can hardly distinguish this from *Pannaria rubiginosa*.

4. **P. xanthomelanum**, Nyland. in *Herb. Hook.*, and in *Dist. Psorom. and Parmel.*, without description.

In various parts of New Zealand, *Lindsay and Colenso*.

*P. euphyllum*, Nyland. *Dist. Psorom. and Parm.* I find no published description of this, which is stated to be remarkable for its laciniate thallus.

## 22. PANNARIA, Delise.

Thallus laciniate and radiate, or granular and scaly, cellular; granules without a cellular coat. Apothecia with or without a border; spores 8, almost always simple. Spermagonia with arthrospores.

A genus of temperate and cold regions.

1. **P. Gayana**, Nyland.—*Parmelia*, Mont.;—Bab. in *Fl. N. Z.* ii. 288. Thallus foliaceous, membranous, leaden-ashy, laciniate at the circumference; laciniae broad, rounded, subentire, concentrically furrowed; beneath blueish-white, tomentose. Apothecia scattered and crowded, reddish, with a single or double border, one thalline, the other of the substance of the disk.—*Parmelia*, Montagne in *Ann. Sc. Nat.* ser. 3. ii. 58.

**Northern** Island, *Colenso*. (Chili.)

2. **P. rubiginosa**, Delise;—Bab. in *Fl. N. Z.* ii. 289. Thallus orbicular, livid-red, cut towards the circumference into broad notched imbricate lobes; beneath blue-black, spongy with fibres. Apothecia rusty-red, nearly flat, with a thick inflexed crenated border.—Nyland. *Lich. Scand.* 122. *Parmelia Fensjonensis*, Fries?; Bab. l. c. 291.

Var. *conopsea*. Thallus thinner, with scattered blue gonidia (*P. conopsea*, Bab. in *Fl. N. Z.* ii. 290).

**Northern** Island: probably common, on moss, bark, etc. **Lord Auckland's** group: common. Apothecia blacker. (*P. Mariana*, Fries?, Bab.) (Cosmopolite.)

3. **P. nigrocincta**, Nyland.—*Parmelia*, Mont.;—Bab. in *Fl. N. Z.* ii. 290. Thallus of close-set membranous reddish scales radiating from a centre, rounded, incised; beneath bluish-black. Apothecia red-brown, flat; border pale, entire.—*Parmelia*, Mont. in *Ann. Sc. Nat.* ser. 2. iii. 91.

**Northern** Island, *Colenso*. (Tropical America, Africa, Java, Juan Fernandez.)

4. **P. pholidota**, Nyland.—*Parmelia*, Mont.;—Bab. in *Fl. N. Z.* ii. 290. t. 128 A. Thallus suborbicular, 1–2 in. broad, of a dull leaden or blueish-green, imbricate, lobulate and crenulate scales, appressed; beneath dull. Apothecia orange-red, scattered, with a thick inflexed crenulate border.—*Parmelia*, Mont. in *Ann. Sc. Nat.* ser. 2. iii. 91.

**Northern** Island: on bark, *Colenso*. (Juan Fernandez, Chili, tropical S. America.)—Babington finds this scarcely distinguishable from the *P. Saubinetii* of France, and the following.

5. **P. microphylla**, *Massolonghi*. Thallus livid, cervine or ashy, rather crustaceous, of closely imbricated crenate scales; beneath black. Apothecia brown or reddish, often convex, pale or whitish within.—Nyland. Lich. Scand. 124.

**Northern** Island, *Colenso*. (Cosmopolite.)

6. **P. triptophylla**, *Nyland*.—*Parmelia*, Fries;—Bab. in Fl. N. Z. ii. 290. Thallus ashy-brown or lead-coloured, forming a thin spreading coraloid, scaly crust; scales dissected; beneath bluish-black. Apothecia small, flat, brown or red-brown, with a paler border.—Nyland. Lich. Scand. 125.

Common in the **Northern** Island: on bark, etc., *Colenso*, etc. (Cosmopolite.)

7. **P. muscorum**, *Nyland*.—*Parmelia*, Ach.;—Bab. in Fl. N. Z. ii. 291. Thallus of flat pale brown or flesh-coloured imbricating scales, with blueish dilated mealy lobed and crenated edges; beneath whitish. Apothecia brown or orange-brown, flat or concave; border slight.—Nyland. Lich. Scand. 127.

**Northern** Island: Bay of Islands, *J. D. H.* (Cosmopolite.)

Dr. Lindsay enumerates as natives of Otago, *P. immirta*, Nyland. n. sp.; *P. leucosticta*, Tuck.; *P. gymnocheila*, Nyland. n. sp.; and *P. nigra*, Huds.

## 23. COCOCARPIA, Persoon.

Thallus almost leafy. Apothecia adnate, without a thalline border, red or brown.

1. **C. molybdæa**, *Persoon*, var. *plumbea*, *Nyland*.—*Parmelia*, Bab. in Fl. N. Z. ii. 289. Thallus orbicular, livid, lead-colour, broadly lobed and notched, thick; centre often granulated; margin imbricate; beneath with blue-black spongy fibres. Apothecia central, small, flat, rusty-red; border very obscure.—Nyland. Lich. Scand. 128.

**Northern** Island: Bay of Islands, *J. D. H.*, barren and doubtful. (Europe.)

## 24. AMPHILOMA, Fries.

Thallus soft, membranous; surface powdery. Granules without a cellular coat. Apothecia unknown.

1. **A. lanuginosum**, *Fries*.—*Parmelia*, Bab. in Fl. N. Z. ii. 290. Thallus orbicular, yellow-white, pulverulent; lobes rounded, plane, imbricate, slightly crenate; beneath grey-black, downy. Apothecia reddish; border powdery.—Nyland. Lich. Scand. 129.

**Northern** Island, *Colenso*, barren and doubtful. (Europe.)

## 25. SQUAMARIA, De Candolle.

Thallus radiating, scaly or cartilaginous. Apothecia with a thalline border paraphyses slender, separate; spores simple, ellipsoid. Spermatogonia immersed, orifice of the same colour as the thallus; spermatia very long, arcuate or nearly straight, cylindric-acicular.

1. **S. gelida**, *Delise*.—*Parmelia*, Ach.;—Bab. in Fl. N. Z. ii. 291.



Thallus orbicular, dirty white, adnate, radiated, lobed and laciniate, crenulate, smooth with large brown central radiated fleshy warts. Apothecia concave, rose-coloured, with a thick elevated entire border.—Nyland. Lich. Scand. 134. *L. macrophthalma* and *L. marmorea*, Tayl.

**Northern** and **Middle** Islands: on rocks, etc., *Colenso*, etc.; Otago, *Lindsay*. (Europe, America.)

Dr. Lindsay enumerates *S. galactina*, Ach., var. *dispersa* amongst his Otago Lichens, also a *Placopsis perrugosa*, Nyland. n. sp.

## 26. PLACODIUM, De Candolle.

Thallus radiating, rarely laciniate. Apothecia with a thalline border, rarely without one; paraphyses separate; spores 8, ellipsoid, 2-locular, rarely simple. Spermatogonia immersed, orifice coloured; spermatia shortly cylindric, slender, attached to arthrosterigmas.

A considerable genus in temperate and cold climates. The New Zealand species are all orange-yellow.

1. **P. fulgens**, DC.—*Parmelia*, Ach.;—Bab. in Fl. N. Z. ii. 291. Thallus orbicular, lemon-coloured, white when dry, adnate, lobed, waved; lobes somewhat imbricate, crenate and lobulate. Apothecia deep orange, at length convex, the border becoming obliterated.—Nyland. Lich. Scand. 137.

**Northern** Island, *Colenso*. (Europe.)

2. **P. elegans**, DC.—*Parmelia*, Ach.;—Bab. in Fl. N. Z. ii. 291. Thallus orbicular, hard, deep orange, adnate, plaited or rugged; lobes linear, compound, convex, wavy. Apothecia central, concave, same colour as the crust; border somewhat inflexed, entire.—Nyland. Lich. Scand. 136. ? *Parmelia aurea*, A. Rich.; Fl. N. Z. 23. t. 8. f. 1.

**Northern** Island: on pebbles, etc., *Colenso*. (Temperate arctic and antarctic regions.)—I find no allusion to *P. aurea*, A. Rich., in Nylander's works, and do not know the species; from the description it chiefly differs from *P. elegans* in the yellow colour being broken up into patches.

3. **P. murorum**, DC. Thallus orbicular, bright yellow, adnate, cracked, plaited and lobed; segments linear. Apothecia central, crowded, sessile, flattish, orange-yellow; border slightly waved.—Nyland. Lich. Scand. 136.

Var. *miniatum*. Thallus a brighter and deeper orange-red.

**Middle** Island: Otago, *Lindsay*, on trap rocks, both states. (Cosmopolitan.)

## 27. LECANORA, Nylander.

Thallus crustaceous, granular or smooth or leprous, rarely radiating. Apothecia with a thalline border; paraphyses separate; spores 8 or more, rarely septate. Spermatogonia with arthrosterigmata, or with very long curved acicular spermatia, or with straight simple sterigmata.

\* Apothecia orange or yellow, reddish in *L. ferruginea*.

1. **L. cerina**, Ach.—*Parmelia rupestris*, DC.;—Bab. in Fl. N. Z. ii. 293. Thallus greyish-white, somewhat granulated, unequal, thin. Apothecia scattered, elevated, flat, at length convex, yellow, warted; border inflexed, somewhat pruinose.—Nyland. Lich. Scand. 144.

**Northern** Island, *Colenso*; Bay of Islands, *J. D. H.* (Europe, Africa, America.)

2. **L. chyrosticta**, *Tayl.*—*Parmelia*, Bab. in Fl. N. Z. ii. 293. Thallus thin, white, studded with large granular buds, which are sometimes tipped with orange. Apothecia crowded, concave; disk yellow, pruinose; thalline border crenulate.—Nyland. Enum. Lich. 115.

**Northern** Island: on bark, Bay of Islands, *J. D. H.*, *Colenso*.

3. **L. aurantiaca**, *Ach.*;—*Bab.* in Fl. N. Z. ii. 292. Thallus granulated, pale lemon-coloured, often rugose. Apothecia sessile, rather convex, orange-yellow, with a yellow waved border.—Nyland. Lich. Scand. 142.

Var. *erythrella*. Thallus rugose and rimose. Apothecia without a border.

Var. *erythrella*. **Northern** Island: on stones, *Colenso*. (Cosmopolite.)

4. **L. ferruginea**, *Nyland*. Thallus spreading, thin, rugged, granular, greyish-white, sometimes evanescent. Apothecia rusty-orange or red-brown, at length convex, with a waved border of the same colour.—Nyland. Lich. Scand. 143.

**Middle** Island: on trap rocks, Otago, *Lindsay*.

5. **L. vitellina**, *Ach.* Thallus leprous, granulated, indeterminate, bright yellow-green, crenulate. Apothecia clustered, sessile, flat, tawny-yellow, at length convex and brownish; border elevated, crenate.—Nyland. Lich. Scand. 141.

**Northern** Island: on rails and other wood, Auckland, *Knight*. (Cosmopolite.)

\*\* *Apothecia black brown or pale.*

6. **L. sophodes**, *Ach.* Thallus orbicular, granulated, dull greenish ash-coloured; apothecia clustered, black-brown when moist, with an elevated entire border.—Nyland. Lich. Scand. 148.

Var. *exigua*, *Nyl.*;—*Bab.* in Fl. N. Z. ii. 292. Thallus whiter. Apothecia with a thin, sometimes crenulate border.—*L. exigua*, *Hook.*

**Northern** Island: Bay of Islands, on wood, *J. D. H.* (Cosmopolite.)

7. **L. cinerea**, *Sommerf.* Thallus grey or ashy white, areolate, rugged and cracked, with a broad greenish undulate border. Apothecia immersed, black, flat, with an entire border.—Nyland. Lich. Scand. 153. *Urceolaria*, *Ach.*

**Middle** Island: trap rocks, Otago, *Lindsay*.

8. **L. parella**, *Ach.*—*Parmelia pallescens*, *Fries*;—*Bab.* in Fl. N. Z. ii. 292. Thallus dirty white, determinate, plaited and warted. Apothecia scattered, thick; disk concave, of the same colour as the thallus, flat, often angular; border tumid, thick.—Nyland. Lich. Scand. 156.

Common throughout the **Northern** and **Middle** Islands, on rocks, wood, the ground, etc., **Lord Auckland's** group, *J. D. H.* (Cosmopolite.)

9. **L. tartarea**, *Ach.* Thallus crustaceous, thick, granular, tartareous, greyish-white. Apothecia scattered; disk convex, at length plain or tumid, yellow-brown or flesh-coloured; border thick, inflexed, at length wavy; spores ellipsoid or subgranular.—Nyland. Lich. Scand. 157. *Porina granulata*, *Tayl.* in Fl. Antart.

Probably common throughout the islands, **Lord Auckland's** group, *J. D. H.* (Cosmopolite.) Scarcely to be distinguished from *L. parella*, but by the thicker thallus and larger browner apothecia (*Nyl.*).

10. **L. parellina**, *Nyland.* Undescribed.

**Northern** Island, *Colenso.* (Java, Chili.)

11. **L. verrucosa**, *Lam.*—*Parmelia*, Fries;—Bab. in Fl. N. Z. ii. 293. Thallus filmy, elliptical, whitish, surrounded by an obsolete border of the same colour. Apothecia blackish, naked or pruinose, rather concave, with a thick entire border.—*Nyland. Lich. Scand.* 156. *Urceolaria*, Acharius.

**Northern** Island, *Colenso.* Specimen imperfect. (Europe, N. America.)

12. **L. glaucoma**, *Ach.* Thallus tartareous, uneven, hard, greyish-white, cracked and areolate. Apothecia crowded, depressed, livid-black or brown, glaucous, often deformed, flat or convex, with a thin entire border.—*Nyland. Lich. Scand.* 159.

**Otago**, on trap rocks, *Lindsay.* (Cosmopolite.)

13. **L. subfusca**, *Ach.*—*Parmelia*, Bab. in Fl. N. Z. ii. 292. Thallus continuous, thin, smoothish, brownish-white or ashy. Apothecia pale or dark brown or black, sessile, slightly convex; border tumid, entire; spores ellipsoid.—*Nyland. Lich. Scand.* 160.

**Northern** Island: probably common, on wood, stones, etc., *Colenso, Knight.* (Cosmopolite.)

14. **L. varia**, *Ach.*—*Parmelia*, Fries;—Bab. in Fl. N. Z. ii. 292. Thallus scattered, thin, granulate, pale yellow-green. Apothecia crowded, flattened, buff or brown; border waved, inflexed, entire; spores ellipsoid, simple.—*Nyland. Lich. Scand.* 163.

**Northern** Island: on stones, *Colenso.* **Lord Auckland's** group: on bark, *J. D. H.* (Europe, Africa, America.)

15. **L. argopholis**, *Nyland.* Thallus pale straw-coloured, yellowish or white, firm, warted and granular, granules crenulate. Apothecia black-brown, with an entire or crenate border.—*Nyland. Lich. Scand.* 166.

Var. *thiodes*.—*Parmelia frustulosa*, Fr., var. *thiodes*, Bab. in Fl. N. Z. ii. 292. Thallus more yellow, with the granular more crowded.

**Northern** Island: var. *thiodes*, on stones, *Colenso.* (Europe, America.)

16. **L. atra**, *Ach.*—*Parmelia*, Bab. in Fl. N. Z. ii. 292. Thallus rugged, subdeterminate, often cracked here and there, white, granulate. Apothecia nearly flat, very black; border white, elevated, at length flexuous and notched; spores ellipsoid.—*Nyland. Lich. Scand.* 170.

**Northern** and **Middle** Islands: probably common on bark and stones, *Colenso, Lindsay*, etc. (Cosmopolite.)

17. **L. punicea**, *Ach.*—*Parmelia*, Bab. in Fl. N. Z. ii. 292. Thallus thin, white, rather glaucous, bordered with black, smooth, not shining. Apothecia rounded, appressed, angular when crowded; disk flattish; margin thin, white, finally crenulate, bright red, convex when old.—*Mont. Crypt. Cuba*, 208; *Eschweiler in Mont. Fl. Bras.* i. 191.

**Northern** and **Middle** Islands: on wood, *Colenso*; **Otago**, *Lindsay.* (Tropical America and Africa, Cape of Good Hope, Java.)

Dr. Lindsay enumerates the following as natives of Otago:—*L. pyracea*, Ach.; *L. um-*

*brina*, Ehr.; *L. simplex*, Dev., and three new species of Nylander's, viz. *L. homologa*, *peloleuca*, and *thiomela*.

### 28. URCEOLARIA, Acharius.

Thallus crustaceous. Apothecia urceolate; spores 8, brown, septate. Spermogonia with branched sterigmata; spermatia cylindric.

1. **U. scruposa**, Ach.—*Parmelia*, Fries;—Bab. in Fl. N. Z. ii. 293. Thallus greyish-white, rugose, granulated, continuous or areolate. Apothecia black, concave, often glaucous; border thick, incurved, rugose and crenulate; spores 5-septate.—Nyland. Lich. Scand. 176.

**Northern** Island, *Colenso*. (Cosmopolite.)

Nylander enumerates *N. stictica*, Krb., as a native of Otago.

### 29. PERTUSARIA, De Candolle.

\* Thallus crustaceous, continuous, irregularly warted or nearly smooth. Apothecia with or without a thalline border, immersed in warts of the thallus; spores 1–8, ellipsoid, large, with a thickish margin, simple. Spermatia acicular.

A genus of temperate and cold country Lichens, rare in the tropics.

1. **P. subverrucosa**, Nyland.—*P. communis*, DC.;—Bab. in Fl. N. Z. ii. 306. Undescribed.

**Northern** Island: on bark and stones, *Colenso*, *Raoul*.

2. **P. subglobulifera**, Nyland. Undescribed.

**Northern** Island, *Colenso*.

3. **P. cucurbitula**, Mont.—*Porina*, Bab. in Fl. N. Z. ii. 306. Thallus radiating, orbicular, cream-coloured, warty, beneath filmy-white, silvery. Apothecia numerous, small, sessile, prominent, subconfluent, of the same colour as the thallus, at first closed, then expanding and margining the apiculate nucleus; nucleus wavy within, at length falling away; asci large, clavate; spores 1-celled.—Mont. in Ann. Sc. Nat. ser. 3. 18, 312.

**Northern** Island: on bark, *Colenso*. (Chili.)

Dr. Lindsay adds from Otago, *P. velata*, Turn.; *perrimosa*, Nyland. n. sp., and *perfidia*, Nyland. n. sp.

### 30. THELOTREMA, Ach.

Thallus thin, crustaceous, continuous. Apothecia on tubercles or warts, with a double margin, the external thalline, the internal of the substance of the apothecium; spores large, fusiform, multilocular.

A large, chiefly tropical genus.

1. **T. lepadinum**, Ach.;—Bab. in Fl. N. Z. ii. 294. Crust small, cream-coloured; warts of the apothecia smooth, conical, truncate. Apothecia 1–2 in a wart, pale brown, with a thin inflexed edge.—Nyland. Lich. Scand. 185.

On bark of trees throughout the islands, and in **Lord Auckland's** group. (Cosmopolitan.)

Dr. Lindsay enumerates *T. monosporum*, Nyland., as a native of Otago.



31. **CÆNOGONIUM**, Ehrenb.

Thallus effuse, of subcontinuous, pellucid, obscurely-articulate filaments, forming a cottony, loosely-interwoven, greenish web. Apothecia orbicular, substipitate, without a border, or margined in the young state only, the disk bearing asci.

A small genus common in warm climates, on bark of trees, remarkable for the Conferva-like structure of the thallus.

1. **C. Linkii**, Ehrenb.;—*Bab. in Fl. N. Z.* ii. 310. Thallus suborbicular, glaucous green. Apothecia saffron-yellow; spores elliptic-ovate, in one series within the filiform subclavate asei.—Fée, *Meth. Lich.* 63. t. 2.

**Northern** and **Middle** Islands: common on trees, etc., *Menzies*, *D'Urville*, etc.

(Cosmopolite in tropical and subtropical countries.)

*C. inflexum*, Nyland., is enumerated amongst Lindsay's Otago Lichens.

32. **BYSSOCAULON**, Mont.

Thallus filiform, spreading, formed of excessively-branched fibres, which are not articulate, and are crisped when dry.

A very anomalous genus, recently regarded by its author, Montagne, as a form of *Pannaria*. (See Mont. *Sylloge, Plant. Crypt.* 293.)

1. **B. filamentosum**, Nyland.;—*Parmelia gossypina*, var. *filamentosa*, *Bab. in Fl. N. Z.* ii. 288. Thallus forming a white cottony stratum.

**Northern** Island, *Colenso*, on moss, barren. (Juan Fernandez.) (I find no specimens in the Herbarium.)

33. **LECIDEA**, Acharius.

Thallus crustaceous, scaly, granular, powdery or 0. Apothecia with a margin of their own substance or 0. Spermatogonia with straight (rarely curved) or acicular or shortly cylindric spermatia.

A very large genus, found in all parts of the world,

§ 1. *Apothecia concave, bright-coloured* (GYALECTA, Ach.).

1. **L. cupularis**, Ach.—*Gyalecta*, *Bab. in Fl. N. Z.* ii. 294. Thallus pale, thin, scattered, ashy or whitish. Apothecia subglobose, salmon-coloured, at length urceolate, with a pale, flesh-coloured, thick, elevated, inflexed, often crenate and pulverulent border; spores ellipsoid, 3-septate.—Nyland. *Lich. Scand.* 190.

**Northern** Island: on stones, probably common, and as far south as **Lord Auckland's** group. (Europe, America, Tasmania.)

2. **L. carneola**, Ach. Thallus mealy, thin, white, or obsolete. Apothecia small, dusky or brownish, suburceolate, with a thick elevated even smooth paler border; spores acicular, many-septate.—Nyland. *Lich. Scand.* 191.

**Northern** Island: on bark, *Colenso*. (Europe, America.)

§ 2. *Apothecia flat or convex, rarely black* (BIATORA, Fries).a. *Crust scaly, spores simple.*

3. **L. parvifolia**, Pers.—*Biatora*, Mont.;—Bab. in Fl. N. Z. ii. 299. Thallus glaucous, scaly; scales lobulate or incised. Apothecia pale red or testaceous, at length convex; border indistinct; spores oblong, simple.—Nyland. Enum. Lich. 120.

**Northern** Island, *Colenso*. (Cosmopolite in the tropics.)

β. *Crust granular, powdery or evanescent. Spores simple, oblong or ellipsoid.*

4. **L. cinnabarina**, *Sommerfeldt*.—*Biatora*, Fries;—Bab. in Fl. N. Z. ii. 300. t. 129 C. Thallus thin, white, effuse, of minute unequal granules. Apothecia scarlet, with an obtuse margin or 0; spores small, simple, fusiform.—Nyland. Lich. Scand. 194.

**Northern** Island: on branches of shrubs, *Colenso*. (Europe, America, Australia, Tasmania.)

5. **L. intermixta**, *Nyland*. Thallus thin, white, effuse or evanescent. Apothecia brownish, flattish; border obtuse or 0; spores ellipsoid, 1-septate.—Nyland. Lich. Scand. 194.

**Kermadec** Island, *Milne*, on bark. (Cosmopolite.)

6. **L. flavo-pallescent**, *Nyland*. Undescribed.

**Northern** Island, *Colenso*.

7. **L. pyrophthalma**, *Nyland*.—*Parmelia*, Bab. in Fl. N. Z. ii. 293. t. 129 A. Thallus very thin, membranous, olive-green, effuse. Apothecia at first globose, yellow, at length plane; disk bright orange; border quite entire, paler; asci filiform; spores cymbiform, 1-septate.—Nyland. Enum. 121. *Biatora*, Mont. Sylloge, 339.

**Northern** Island, *Colenso*, on bark. (Chili.)

8. **L. vernalis**, *Ach*.—*Biatora*, Fries;—Bab. in Fl. N. Z. ii. 300. Thallus thin, powdery, ashy or greenish-white or obsolete. Apothecia clustered, rusty flesh-coloured, convex, white internally, at length often globose; spores oblong.—Nyland. Lich. Scand. 200. *Biatora anomala*, Fries?; Bab. in Fl. N. Z. l. c.

**Northern** Island: on moss, etc., *Colenso*, *Sinclair*. (Europe, etc.)

9. **L. decolorans**, *Flærke*. Thallus leprous, grey, with white granulations, effuse, thin. Apothecia pale brown, blackish or brick-red, opaque, flat, with a pale appressed border, white within; spores ellipsoid, oblong.—Nyland. Lich. Scand. 197.

**Northern** Island, *Colenso*. (Europe, N. America.)

10. **L. coarctata**, *Nyland*.—*Parmelia*, *Ach*.;—Bab. in Fl. N. Z. ii. 291. Thallus spreading, thin, cracked, greyish, unequal. Apothecia with the disk somewhat immersed, at length elevated, flat, black; border elevated, inflexed, coarctate, irregular, pulverulent.—Nyland. Lich. Scand. 196.

**Northern** Island, *Colenso*. (Cosmopolite.)

β. *Thallus* grey or white, granular, powdery or evanescent. *Spores* acicular or oblong, 1-many-septate.

11. **L. rosella**, *Ach.*—*Biatora*, Fries;—Bab. in Fl. N. Z. ii. 300. *Thallus* ashy, thin, unequal or granular. *Apothecia* rose-red or flesh-coloured, rather powdery; border obtuse, white within; spores acicular, many-septate.—Nyland. Lich. Scand. 209.

**Northern** Island, *Colenso*. (Europe.)

12. **L. ceroplasta**,—*Biatora*, Bab. in Fl. N. Z. ii. 300. *Thallus* white, waxy, thickish, granular, subpellucid; granules minute. *Apothecia* large, appressed, flattish, at length convex, red, not pruinose, internally flesh-coloured; border thin, flesh-coloured; spores not found.

**Northern** Island, *Colenso*.—Compared with *L. rosella* by Babington, but of a peculiarly waxy hue. Omitted in Nylander's 'Enumeratio Lichenum.'

13. **L. marginiflexa**, *Tayl.*—*Biatora*, Bab. in Fl. N. Z. ii. 299. t. 129 B. *Thallus* white, glaucous, thin, minutely cracked, leprous, bordered with black. *Apothecia* rather large, crowded, purplish when moist; disk pruinose, convex; border thin, flexuous; spores oblong, 1-septate.

**Northern** Island: common on mosses, bark, etc. (Australia, India).—Perhaps not distinct from *L. tuberculosa*, Fée, and if so perhaps no *Biatora*. The *apothecia* are very concave and dark, as in *Gyalecta*, and the disk dark, almost black. Nylander places it in his section *Biatora*.

14. **L. tuberculosa**, *Fée*, *Essai sur Cryptolg. des Écorces Officin.* 107. t. 27. f. 1. *Thallus* crustaceous, tuberculate, pale sulphur-coloured, indefinite. *Apothecia* scattered, black, flattish; margin slender, entire, evanescent, horny internally; spores many-septate.—Nyland. Enum. 123.

**Northern** Island, *Colenso*, on bark. **Lord Auckland's** group, *J. D. H.* (Tropical America, Madagascar, Australia.)

15. **L. Domingensis**, *Ach.*?—*Parmelia gyrosa*?, Mont.;—Bab. in Fl. N. Z. ii. 293. *Thallus* orbicular, glaucous, imbricate; laciniae flat, palmately multifid at the tips; margins repand, toothed, powdery, beneath white, fibrillose. *Apothecia* scattered, brownish, pruinose; border inflexed, at length crenulate; spores many-septate.—Nyland. Enum. 123. *Parmelia*, Mont. Crypt. Cuba, 212.

**Northern** Island: on bark, mosses, etc., *Colenso*.—Specimens imperfect. (W. Indies.)

### § 3. *Apothecia* black.

#### a. *Thallus* scaly.

16. **L. decipiens**, *Ach.*—*Biatora*, Fries;—Bab. in Fl. N. Z. ii. 299. *Thallus* of roundish subimbricate scales or concave lobes, flesh-coloured or red, at length brown; margins white. *Apothecia* marginal, convex or subglobose, brown-black inside; border obsolete; spores ovoid or elliptic.—Nyland. Lich. Scand. 214.

**Northern** Island: on rocks, *Colenso*. (Cosmopolite.)

17. **L. mamillaris**, *Dufour*;—Bab. in Fl. N. Z. ii. 300. *Thallus* white, turgidly areolate, somewhat lobed and plaited, cancellated or cracked. *Apo-*

thecia on the margins of the areolæ; spores oblong.—Nyland. Prod. Lich. Gall. and Alg. 120.

**Northern** Island: on rocks and earth, *Colenso*. (South Europe.)

18. **L. vesicularis**, *Ach.*—*Bab.* in *Fl. N. Z.* ii. 301. Thallus of irregular imbricated tumid powdery greyish warts or scales. Apothecia irregular, black, flattish, marginal on the scales, at length hemispherical; spores narrow, fusiform or subacicular.—Nyland. Lich. Scand. 214.

**Northern** Island, *Colenso*. (Cosmopolite.)

19. **L. Colensoi**, *Bab.*—*Biatora*, *Bab.* in *Fl. N. Z.* ii. 298. Thallus scaly; scales subimbricated, ascending, lobed, erose, glaucous, ferruginous below, with a subferruginous medullary stratum. Apothecia ferruginous, black, with paler margins, at first concave, at length confluent, deformed, ferruginous internally, glaucous and pruinose.

**Northern** Island: on earth, *Colenso*.

*β. Thallus granular, powdery or evanescent.*

20. **L. parasema**, *Ach.*—*Bab.* in *Fl. N. Z.* ii. 301. Thallus crustaceous, thin, greyish, uninterrupted, somewhat granulated, edged with black. Apothecia sessile, flat, opaque, black, at length convex; border smooth, black; spores ellipsoid, simple.—Nyland. Lich. Scand. 217? *L. albidoplumbea*, *Tayl.* *Fl. N. Z.* i. c. 302. *L. geomæa*, *Tayl.* *Fl. Antarct.* (*L. papillata*, *Fries*, *ibid.* in *Suppl.* p. 547.)

**Northern** Island: on smooth bark of trees, common, *Colenso*, *Knight*, etc. **Lord Auckland's** group: on bark and the ground, *J. D. H.* (Cosmopolite.)

21. **L. atro-alba**, *Flotow*;—*Bab.* in *Fl. N. Z.* ii. 301. Thallus crustaceous, grey or white, spreading, cracked and granular, somewhat mealy. Apothecia sunk to a level with the crust, small, crowded, black, pruinose, ashy within; spores ellipsoid, 1-septate.—Nyland. Lich. Scand. 233.

**Northern** Island: on stones, etc., common, *Colenso*, etc. (Cosmopolite.)

22. **L. contigua**, *Fries*;—*Bab.* in *Fl. N. Z.* ii. 301. Thallus crustaceous, ashy or white, thin or rather thick, continuous, cracked or areolate. Apothecia sessile, black within and without, often pruinose; spores ellipsoid, simple.—Nyland. Lich. Scand. 224.

Var. *platycarpa*. Thallus obsolete. Apothecia larger, pruinose; disk white within, on a black substratum.—*L. platycarpa*, *Ach.* *Bab.* i. c. *L. petraea*, *Tayl.*

**Northern** and **Middle** Islands: on calcareous and other rocks, *Colenso*, *J. D. H.*; *Otago*, *Lindsay*. (Cosmopolite.)

23. **L. lapicida**, *Fries*;—*Bab.* in *Fl. N. Z.* ii. 301. Thallus crustaceous, glaucous white, tessellated and granulated. Apothecia sessile, plane or convex, angular, black, with a narrow elevated border, black or dark grey within.—Nyland. Lich. Scand. 225.

**Northern** Island: on rock, *Colenso*. (Europe.)

24. **L. abietina**, *Ach.*?—*Bab.* in *Fl. N. Z.* ii. 302. Thallus crustaceous, spreading, smooth, erose, pale glaucous or leprous, effuse or evanescent. Apothecia sessile, flattish, black, pruinose, with a black border; spores fusiform, 3-septate.—Nyland. Lich. Scand. 241.

**Northern** Island: on sandstone rocks, *Colenso*. (Europe.)—A doubtful identification.



25. **L. disciformis**, Fries. Thallus crustaceous, thin, white, continuous, determinate, unequal, often evanescent. Apothecia flat or subconvex, black, bordered; spores brown, ellipsoid or oblong, 1-septate,—Nyland. Lich. Scand. 236.

Var. *albula*, Nylander.

**Northern** Island: on quartz rocks, *Colenso*.

γ. *Thallus* yellow, crustaceous.

26. **L. geographica**, Schärer. Thallus crustaceous, bright yellow, smooth, cracked, tessellated; areolæ edged with black. Apothecia flat, black, often confluent; spores brown or black, 3- or more-septate.—Nyland. Lich. Scand. 248.

**Middle** Island: Otago, on rocks, *Lindsay*. (Cosmopolite in cold regions.)

27. **L. citrinella**, Ach.—*L. flavo-virescens*, Fries, Bab. in Fl. N. Z. ii. 301. Thallus crustaceous, thin, bright yellow, continuous. Apothecia appressed, black outside and within; spores acicular.—Nyland. Lich. Scand. 248.

**Northern** Island, *Colenso*, on rocks. (Europe.)

28. **L. pachycarpa**, Dufour.—*Biatora*, Fries, Bab. in Fl. N. Z. ii. 229. Thallus leprous, mealy, soft, uneven, greyish-green. Apothecia scattered, sessile, brown, with a pale brown, even, smooth border; spores many-septate.—Nyland. Prod. Lich. Gall. and Alger. 118. *L. incana*, Ach.; Fl. Antarctica.

**Northern** Island: on rocks, trees, and banks, *Colenso*. **Lord Auckland's** group, on the ground, *J. D. H.* (Europe.)

29. **L. tuberculosa**, Fée, *Essai sur Cryptol. des Écorces Officin.* 107. t. 27. f. 1. Thallus crustaceous, tuberculate, pale sulphur-coloured, indefinite. Apothecia scattered, black, flattish; margin slender, entire, evanescent, horny internally; spores many-septate.—Nyland. Enum. 123.

**Northern** Island, *Colenso*, on bark. **Lord Auckland's** group, *J. D. H.* (Tropical America, Madagascar, Australia.)

δ. *Parasitic species, consisting of Apothecia growing on other Lichens.*

30. **L. oxyspora**, Nyland. Apothecia black or brown, minute, flat or slightly convex, brownish within; spores fusiform, ellipsoid.—Nyland. Lich. Scand. 247. *Abrothallus*, Tulasne in Mem. Lich. 116. t. 16. f. 27.

**Middle** Island: Otago, parasitic on *Parmelia conspersa*, *Lindsay*. (Europe, Asia.)

The following are enumerated in Dr. Lindsay's Otago catalogue:—*L. furfuracea*, Pers.; *subsimplis*, Nyl.; *sabuletorum*, Flk.; *trachona*, Flot.; *allotropa*, Nyl., n. sp.; *melanotropa*, Nyl., n. sp.; *millegrana*, Tayl.; *pulverea*, Bow.; *leucothalamia*, *Otagensis*, *amphitropa*, and *flavido-atra*, all n. sp. of Nylander; *arceutina*, Ach.; *fusco-atra*, Ach.; *petræa*, Flot.; *stellulata*, Tayl.; *myriocarpa*, DC.; *lenticularis*, Ach.; *grossa*, Pers.; and *Curreyi*, Lindsay (a species of *Abrothallus*).

### 34. **GRAPHIS**, Ach.

Thallus very thin, continuous, often scarcely visible above or below the bark on which the plant grows. Apothecia linear, black, simple or forked,

with a raised thallodal border; paraphyses slender, distinct; spores oblong, many-celled.

A large tropical and subtropical, rarely temperate genus of Lichens, growing on the bark of trees, comparatively rare in temperate climates.

1. ***G. scripta***, *Ach.*;—*Bab. in Fl. N. Z.* ii. 302. Thallus thin, membranous, smooth, somewhat shining, grey-white, indistinctly bordered with black. Apothecia partly immersed, black, naked or pruinose, flexuose, simple or branched; branches subparallel; spores oblong, 7–9-celled.—Nyland. Lich. Scand. 251.

**Northern** Island: on bark, *Colenso, Knight*. (Cosmopolite.)

2. ***G. anguina***, *Mont. Sylloge*, 352 (*Ustalia*). Thallus between membranous and crustaceous, white, minutely granular. Apothecia immersed, minute, crowded, linear, flexuose, simple and forked; border prominent; disk brown, concave, convex when moist; spores oblong-cylindric, multicellular.

**Northern** Island: Auckland, *Knight*, on bark. (Cosmopolite.)

3. ***G. elegans***, *Ach.* Thallus orbicular, granulated, white. Apothecia immersed, scattered, divaricating, usually simple, with a grooved as well as thallodal border; spores cylindric-fusiform, about 10-septate.—Nyland. Prodr. Lich. Gall. et Alger. 151.

**Northern** Island: Auckland, *Knight*, on bark. (Almost cosmopolitan.)

4. ***G. sculpturata***, *Ach.* Thallus yellow, membranous. Apothecia short or long, simple forked or branched, flexuose; margined by a thickening of the thallus; disk black, deciduous; spores large, brown, oblong, 10-septate and usually divided.—*Mont. in Ann. Sc. Nat. ser. 2. xviii.* 274.

**Northern** Island: Auckland, *Knight*, on bark. (Tropical America.)

5. ***G. confinis***, *Knight and Mitten in Linn. Trans.* xxiii. 102. *t. 11. f.* 20. Thallus cream-coloured or grey. Apothecia immersed, elongate, wavy, sometime forked or branched, ends acute, closed by the inflexed border; perithecium entire below or dimidiate; spores 6–8-septate, interspaces transversely oval, 0.00034 in. broad, 0.0011 in. long.

**Northern** Island: Auckland, on bark of trees, *Knight*.—Near *G. scripta*, but thallus paler and border of perithecium narrower and thicker.

6. ***G. (Fissurina) insidiosa***, *Knight and Mitten, l. c. t. 12. f.* 21. Thallus thick, uneven, warty, dull green, brownish when dry. Apothecia crowded, deeply immersed in warts of the thallus, simple or branched, closed; lips paler; spores in single series, ovoid or obovate, yellow, 0.0003 in. broad, 0.0007 long.

**Northern** Island: Auckland, on bark of trees, *Knight*.—Apothecia invisible to the naked eye.

7. ***G. (Fissurina) inquinata***, *Knight and Mitten, l. c. t. 12. f.* 22. Thallus cartilaginous, polished, ashy-grey or brown, uneven. Apothecia deeply immersed, narrow, elongate, wandering, variously branched and wavy, almost covered by the darkened border of the thallus; spores oblong or obovate, yellow, 3–4-septate, 0.00040 in. broad, 0.00084 long.

**Northern Island:** Auckland, on bark, *Knight*.—Browner than *G. insidiosa*, thallus less warty, apothecia faintly visible by a dark line. It may be a form of *G. nitida*, Mont.

### 35. OPEGRAPHA, Ach.

Thallus excessively thin or almost evanescent. Apothecia superficial or with the base innate, black, linear-lanceolate rounded or linear, elongate, flexuose or branched, with a proper border; epithecium plane or like a narrow slit; spores colourless or brownish, fusiform, few-septate. Spermatia slender, cylindric straight or curved.

A very large tropical or subtropical genus, rarer in temperate regions.

1. ***O. varia*, Persoon.** Thallus thin, powdery, white or brown, dispersed. Apothecia sessile, prominent, scattered, roundish oval or oblong, wavy; disk plane, at length convex, hemispherical, somewhat tuberculose; border sub-evanescent; spores fusiform, 3-9-septate.—Nyland. Lich. Scand. 252.

Var. Thallus olive-green; apothecia superficial, slender; spores 5-9-septate, 0.0003 in. broad, 0.00115 long.—Knight and Mitt. in Trans. Linn. Soc. 23. 101. t. 11. f. 15.

Var. Thallus olive-brown, tending to grey; apothecia more or less immersed when moist; margin separating in the middle; spores  $\frac{1}{4}$ -5-septate, 0.00024 in. broad, 0.0009 long.—Knight and Mitt. l. c. f. 16.

Var. Thallus dusky-grey; apothecia immersed when moist, oblong, open; spores 3-4-septate, 0.00025 in. broad, 0.0007 broad.—Knight and Mitt. l. c. f. 17.

**Northern Island:** Auckland, on bark, *Knight*. (Cosmopolite.)

2. ***O. atra*, Ach.** Thallus very thin, membranous, smooth, whitish. Apothecia sessile, various in shape, the smaller globose or oblong, the larger long, narrow, terete, subrugulose, coal-black, simple or divided; spores oblong-ovoid, 3-septate.—Nyland. Lich. Scand. 254.

**Northern Island:** Auckland, on bark, *Knight*. **Lord Auckland's group**, *J. D. H.* (Cosmopolite.)

3. ***O. herpetica*, Ach.** Thallus continuous, limited, very thin, reddish ash-coloured or brownish, slightly rugged. Apothecia immersed, oblong linear rounded or elliptic, somewhat curved, the disk broader than the border; spores fusiform, 3-septate.—Nyland. Lich. Scand. 255.

Var. *rufescens*. Apothecia flexuose, sometimes divided.

**Northern Island:** Auckland, on bark, *Knight*.

4. ***O. cinerea*, Knight and Mitt. in Linn. Trans. xxii. 101. t. 12. f. 18.** Thallus ashy-grey, pulverulent, sometimes obsolete. Apothecia superficial, simple, oblong, straight or curved, closed; spores brown, 3-septate or 1-septate and contracted in the middle, frequently murally divided, 0.00025 in. broad, 0.00075 long.

**Northern Island:** Auckland, on bark, *Knight*.—The short thick closed apothecia at once distinguish this from *O. varia*.

5. ***O. prominula*, Knight and Mitt. l. c. 102. t. 11. f. 19.** Thallus white, uneven or minutely warted, moderately thick, containing extensive patches of green round gonidia. Apothecia superficial, crowded, subparallel or disposed in all directions, straight or curved, closed; spores ellipsoid or oblong, 7-septate, 0.00015 in. broad, 0.0008 in. long.

**Northern** Island: Auckland, on bark, *Knight*.—Resembles *O. varia*, but the thallus is even and whiter, the apothecia usually entirely closed by the more prominent border.

Dr. Lindsay, in his 'Catalogue of Otago Lichens,' adds three new species of Nylander,—*O. agelæoides*, *spodopolia*, and *subeffigurans*.

### 36. PLATYGRAPHIS, Nyland.

Thallus thin or obsolete. Apothecia black, flat, simple, no proper border, but sometimes a thin thallodal border. Spores colourless, fusiform, septate. Spermatia shortly cylindric, straight or slightly curved.

A considerable tropical and temperate genus of corticolous Lichens.

1. **P. microstieta**, *Knight and Mitt. in Linn. Trans.* xxiii. 103. t. 12. f. 23. Thallus dusky-grey. Apothecia round or oblong, flexuose, simple or branched, broader at one end; ends rounded. Apothecia dark brown; hypothecium black; spores fastigate, fusiform, 3-septate, 0·00010 in. broad, 0·00140 long.

**Northern** Island: Auckland, *Knight*, on bark.—Thallus covered everywhere at equal distances by the apothecia, which resemble specks to the naked eye.

2. **P. inconspicua**, *Knight and Mitt. l. c. t. 24.* Thallus brown, with a lilac tinge when dry. Apothecia immersed, very minute, roundish or oblong, one end acuminate, blackish brown; spores fastigate, ? not septate, fusiform, 0·00120 broad, 0·00175 in. long.

**Northern** Island: Auckland, on bark, *Knight*. Remarkable for its lilac colour. Apothecia invisible till magnified, then like black dots.

3. **P. tumidula**, *Knight and Mitt. l. c. f. 25.* Thallus dark yellow-brown. Apothecia flat, surrounded by the somewhat swollen thallus, elongate or short-curved, defined by a narrow dark line; hypothecium brownish-black; spores fastigate, without septa, fusiform, 0·0001 in. broad, 0·0014 long.

**Northern** Island: Auckland, *Knight*, on bark.—Thallus colour of *Lecidia parasema*. Apothecia conspicuous, variable in form and size.

4. **P. occulta**, *Knight and Mitt. l. c. 104. t. 12. f. 26.* Thallus reddish-brown, obscure. Apothecia irregularly branched, subradiate, angular; edges torn; thallodal border raised, powdery, white; epithecium blackish-brown, flat; hypothecium black; spores fastigate, fusiform, 4-?-septate, 0·00005 in. broad, 0·00160 long.

**Northern** Island: Auckland, on bark, *Knight*.—Apothecia invisible till magnified.

Dr. Lindsay enumerates *P. longifera*, Nyland. n. sp.

### 37. PLAGIOGRAPHIS, Knight and Mitten.

Thallus very thin, obscure. Apothecia elongate, like cracks, surrounded by a perithecium, which is covered by the thallus, connivent above, divaricated and oblique below; hypothecium free. Asci pyriform; spores 2-locular.

A genus only known from New Zealand.

1. **P. devia**, *Knight and Mitt. in Linn. Trans.* xxiii. 104. t. 12. f. 27. Thallus smooth, yellow or grey. Apothecia blackish-brown, elongate,



flexuose or branched, contracted here and there; thallodal margin very thin, at length erect; epithecium nearly covered by the perithecial walls, dark-coloured; spores contracted in the middle, 1-septate, upper cell larger, 0·00030 in. broad, 0·00065 long.

**Northern Island:** Auckland, on smooth bark, *Knight*.—Apothecia externally like black pecks. At first sight this resembles an *Arthonia*.

2. ***P. rubrica***, *Knight and Mitt. l. c. f.* 28. Thallus corneous, polished, red or reddish-brown. Apothecia round oblong or elongate and nerved, without thallodal border, blackish-brown, slightly prominent, open; perithecium extending far below the thallus; spores 1-septate, 0·00020 in. broad, 0·00053 long.

**Northern Island:** Auckland, on smooth bark, *Knight*.—Similar to *P. devia*, but differently coloured, and with open apothecia.

### 38. STIGMATIDIUM, Meyer.

Thallus thick, crustaceous or cartilaginous. Warts containing the apothecia crowded, punctiform, solitary or in series, immersed, indehiscent, without a border.

A small genus of tropical and temperate corticolous Lichens, found in various parts of the world.

1. ***S. crassum***, *Duby*. Thallus cartilaginous, undulated, olive-brown, smooth, black-edged. Warts of the apothecia large, irregular, many-celled, with numerous, black, slightly depressed, often confluent and then linear curved points.—Nyland. Prodr. Lich. Gall. and Alger. 163.

**Northern Island:** on bark, *Colenso*. (West Europe, N. Africa.)

### 39. ARTHONIA, Ach.

Thallus thin, superficial or beneath the bark, or evanescent or none. Apothecia flat, without a border, separate paraphyses none; asci pyriform, easily separable from the apothecium; their walls thickened at the tip; spores 4–8, ovoid, septate. Spermatia cylindric, straight or curved.

A large genus of Lichens, growing on wood and bark in all latitudes.

1. ***A. lurida***, *Ach.*—*Myriangium inconspicuum*, Bab. in Fl. N. Z. ii. 310. t. 128 B. Thallus somewhat tartareous, thin, cracked, uneven, white. Apothecia crowded, immersed, thin, flat, confluent, brownish lead-coloured, pruinose, internally of the same colour; spores ovoid, 1-septate.—Nyland. Lich. Scand. 268.

**Northern Island:** on dead leaves, *Colenso*. (Europe.)

2. ***A. pruinosa***, *Ach.*—*Lecanactis impolita*, Fries;—Bab. in Fl. N. Z. ii. 303. Thallus white, thin, cracked, somewhat uneven. Apothecia immersed, flat, confluent, brownish lead-coloured, pruinose, same colour within; spores ovoid, 3-septate.—Nyland. Lich. Scand. 258.

**Northern Island:** Auckland, on bark, *Knight*. (Europe, N. America.)

3. **A. astroidea**, *Ach.* Thallus beneath the bark, indicated by a white patch outside, more or less determinate. Apothecia appressed, lobed, divided, substellate, ashy-grey within; spores ovoid, 3-septate.—Nyland. Lich. Scand. 259.

**Northern Island**: Auckland, on bark, *Knight*. (Cosmopolite.)

4. **A. minutula**, *Nyland*. Thallus indicated by a white spot on the back. Apothecia black, slender, flexuose, irregular; spores ovoid, 1-septate.—Nyland. Prodr. Lich. Gall. et Alger. 169.

**Northern Island**: on bark, *Colenso*. (Europe.)

5. **A. lobulata**, *Knight and Mitt. in Linn. Trans.* xxiii. 104. t. 12. f. 29. Thallus ochreous or grey. Apothecia angular, lobed or subradiate, plane; margin defined by a narrow line, deep brown, almost black; spores 1-septate, oblong, light yellow, 0.0002 in. broad, 0.0006 long.

**Northern Island**: Auckland, on bark, *Knight*.—Differs from the other New Zealand species in the clavate asci, with the spores in parallel lines.

6. **A. indistincta**, *Knight and Mitt. l. c.* 105. t. 12. f. 30. Thallus grey, thin. Apothecia irregularly elongate-oblong, simple or branched; border ragged, obscure, grey black, convex; spores 3-septate, oblong, constricted in the middle, terminal cells much smallest.

**Northern Island**: Auckland, *Knight*, on bark.—Apothecia mere specks, when magnified the borders seem to fade into the thallus.

7. **A. albidia**, *Knight and Mitt. l. c.* t. 12. f. 31. Thallus white or dull white; edges filamentous. Apothecia prominent, smooth, lobed or angular; thalldal border thin, erect, lilac-brown, powdery; hypothecium pale, with a black spot sometimes at the sides; spores 3-septate, obovate, yellow; upper cell largest.

**Northern Island**: Auckland, on bark, *Knight*.—Resembles *A. cinnabarina*, but apothecia smaller.

8. **A. ramulosa**, *Knight and Mitt. l. c.* t. 12. f. 32. Thallus dull white, thin, brown. Apothecia superficial, black, dark brown at the base and sides, much branched, bordered by a narrow undulating line; spores 3-septate, oblong or obovate, brown; upper cell largest, 0.00020 in. broad, 0.00045 in. long.

**Northern Island**: Auckland, on bark, *Knight*.—Apothecia more branched and prominent than in *A. astroidea*.

9. **A. ampliata**, *Knight and Mitt. l. c.* 106. t. 12. f. 33. Thallus grey, 1 in. and more diameter. Apothecia copious, scattered or parallel, roundish or oblong, partly veiled by the ruptured thallus, blackish-brown; spores brown, 5-6-septate; upper cell largest, others often longitudinally divided, 0.0005 in. long, 0.0013 long.

**Northern Island**: Auckland, on bark, *Knight*.

10. **A. nigro-cincta**, *Knight and Mitt. l. c.* t. 12. f. 34. Thallus moderately thick, whitish-brown, with a lilac tinge, edged with dark. Apothecia thinly scattered, superficial, simple, irregular, roundish, oblong, bent or

curved, one end larger, blackish-brown, internally brown; spores obovate, 4-septate, light yellow, 0.00030 in. broad, 0.00084 long.

**Northern** Island: Auckland, on bark, *Knight*.—The apothecia have no dark marginal line as in most of its allies.

11. **A. polymorpha**, *Ach.*;—*Bab. in Fl. N. Z.* ii. 302. Thallus submembranous, ashy-white, variegated with olive-green. Apothecia large, suborbicular, pruinose, glaucous-blue, when moist, tumid, tubercular and black; spores murally divided.—*Eschweiler in Mart. Ic. Sel. Crypt. Bras.* 14. t. 9. f. 3 (not in *Nyland. Enum.*).

**Northern** Island: on bark, *Colenso*. (Brazil.)

The following *Arthonia* are enumerated in Dr. Lindsay's 'Catalogue of Otago Lichens': *A. excidens*, *Nyl.*; *conspicua*, *Nyl.*; and *platygraphella*, *Nyl. n. sp.*

#### 40. MELASPILEA, *Nyland.*

Thallus excessively thin or obsolete. Apothecia as in *Arthonia*, black, superficial; paraphyses distinct; spores 8, usually colourless, 1-septate. Spermatia straight.

A small cosmopolitan genus.

1. **M. deformis**, *Nyland.* Thallus white, very thin or obsolete. Apothecia smallish, rounded or deformed, often confluent into a rugulose mass; border obtuse or 0; spores ovoid.—*Nyland. Lich. Scand.* 263. *Opegrapha gregaria*, *Ach.*

**Northern** Island: Auckland, on bark, *Knight*. (Europe.)

#### 41. NORMANDINA, *Del.*

Thallus of thin orbicular scales. Apothecia black, closed, with a punctiform aperture, immersed.

A genus of 2 species. (European and American.)

1. **N. Jungermannia**, *Delise*.—*Coccocarpia? pulchella*, *Bab. in Fl. N. Z.* ii. 273. Thallus glaucous, tips of the scales reflexed. Apothecia in tubercles of the thallus; peritheciium black; epithecium black, prominent; spores oblong-cylindric, usually at most 7-septate.—*Nyland. Prodr. Lich. Gall. and Alg.* 174.

**Northern** Island: Bay of Islands, *J. D. H.* (Europe.)

#### 42. TRYPETHELIUM, *Ach.*

Thallus imperfectly developed or beneath the bark. Apothecia compound, many together being immersed in a depressed or elevated imperfect thallus, black, thin; spores usually 8, rarely 2 or 4; paraphyses slender, mostly branching.

A genus of corticolous, chiefly tropical Lichens.

1. **T. madreporiforme**, *Eschweiler*;—*Bab. in Fl. N. Z.* ii. 305. Thallus

faintly indicated, yellowish-green, somewhat shining and wavy. Apothecia several together, in convex brown tubercles, with a slightly depressed pore; spores oblong.—Nyland. Exp. Synops. Pyren. 78.

Var. *β. obscurius*, Bab. l. c. Thallus white, subpapillose, evanescent; thallus brownish within.

**Northern** Island: var. *β*, on old bark, *Colenso*. (Var. *α*, tropical America and Africa.)

#### 43. ENDOCARPON, Hedwig.

Thallus peltate or scaly or areolate. Apothecia pale, rarely brown, closed, with a punctiform orifice; paraphyses 0; spores 8, simple, colourless, elliptic-oblong. Spermatogonia with arthrosterigmata.

A considerable genus, found on stones and rocks in all latitudes.

1. ***E. hepaticum***, *Ach.*—*E. pusillum*, Hedw.;—Bab. in *Fl. N. Z.* ii. 306. Thallus of red-brown, subcartilaginous, adnate, simple, grey-brown scales; margin blackish, fibrillose. Apothecia with brownish-black protruded tips.—Nyland. Lich. Scand. 265.

**Northern** Island: on the ground, *Colenso*. (Cosmopolite.)

2. ***E. fluviatile***, *De Cand.*;—*Bab. in Fl. N. Z.* ii. 306. Thallus peltate, lurid-brown, broadly expanded, polyphyllous, blackish below.—Nyland. Lich. Scand. 265.

**Northern** Island, *Colenso*. (Europe.)

#### 44. VERRUCARIA, Persoon.

Thallus scaly, areolate, continuous, powdery, or beneath the bark or obsolete. Apothecia black or pale, closed, with a punctiform orifice; spores various. Spermatogonia with simple sterigmata.

A very large, chiefly temperate genus of minute Lichens, found on rocks, stones, earth, bark, etc.

Series 1. *Species found on stone.*

1. ***V. rupestris***, *Schrad.*—*V. immersa*, Pers., and *V. muralis*?, *Ach.*;—*Bab. in Fl. N. Z.* ii. 307. Crust indeterminate, thin or evanescent, whitish, smooth. Apothecia small, black, globose, sunk in a hollow of the crust and of the stone; upper part pale, sunken part black; spores ellipsoid.—Nyland. Lich. Scand. 275.

**Northern** Island: on calcareous and sandstone rocks. Identification doubtful. (Cosmopolite.)

2. ***V. umbrina***, *Wahl.*;—*Bab. in Fl. N. Z.* ii. 307. Thallus brown or blackish, thin, opaque, smooth or unequally granular, cracked or areolate, often widely extended. Apothecia immersed in mamillary tubercles of the thallus, pale, of the same colour as the thallus; spores murally divided.—Nyland. Lich. Scand. 269.

**Northern** Island: on pebbles, *Colenso*; in a bad state. (Cosmopolite.)

3. ***V. maura***, *Wahl.*;—*Bab. in Fl. N. Z.* ii. 307. Thallus thin, continu-



ous, imperfectly defined, smooth, coal-black, with innumerable minute cracks. Apothecia black, immersed in slightly swollen papillæ of the thallus, dot-like; spores ellipsoid, simple.—Nyland. Lich. Scand. 275.

**Northern** and **Middle** Islands: on stones on the beach, *Colenso*; Otago, on trap rock, *Lindsay*. (Cosmopolite?)

Series 2. *Species growing on bark.*

*a. Spores usually 1-septate.*

4. **V. gemmata**, *Ach.*—*V. alba*?, *Schrad.*;—*Bab. in Fl. N. Z. ii. 307.* Thallus almost filmy, whitish, indeterminate, continuous or somewhat cracked, nearly smooth. Apothecia large, prominent, hemispherical or deformed, naked or invested with a thin film; asci cylindric; spores ellipsoid.—*Nyland. Exp. Synops. Pyren. 53.*

**Northern** Island: Bay of Islands, on bark, *J. D. H.* (Europe, N. America.)

5. **V. epidermidis**, *Ach.* Thallus very thin, spreading, cream-coloured. Apothecia black, very minute, roundish, convex, circumference depressed, with a hemispherical central mamilla; spores oblong or ovoid-oblong.—*Nyland. Exp. Synops. Pyren. 58.* *V. punctiformis*, *DC.*; *Fl. Antarct.*

*Var. gemellipara*, *Knight in Linn. Trans. 23. 99. t. 11. f. 3.* Thallus yellowish, with a black border. Apothecia crowded, when moist hidden by the epidermis; spores obovate; upper cell largest.

*Var. pseudo-punctiformis*, *Knight, l. c. t. 11. f. 4.* Thallus fulvous. Apothecia crowded, more or less superficial, but prominent when dry, dimidiate. Spores obovate fusiform, sometimes 5-septate.

**Northern** and **Middle** Islands: Auckland, on bark, *Knight.* (Cosmopolite.)

6. **V. minutella**, *Knight, l. c. t. 11. f. 1.* Thallus thin ashy, smooth, effuse. Apothecia, when moist immersed, dry, innate, very minute, crowded, entire, globose; asci elliptic-oblong; spores yellow, clavate, 0.00014 in. broad, 0.0006 in. long.

**Northern** Island: Auckland, *Knight.*

7. **V. binucleolata**, *Knight, l. c. t. 11. f. 2.* Thallus brown, effuse. Apothecia small, superficial, dimidiate, spreading at the base; asci elongate, cylindric; spores brown, 2-nucleolate, obovate, 0.00034 in. broad, 0.00065 in. long.

**Northern** Island: Auckland, on bark, *Knight.*

8. **V. magnospora**, *Knight, l. c. t. 11. f. 5.* Thallus ashy-black, contiguous, effuse, with a black border. Apothecia naked, large, with a white border, dimidiate, spreading at the base; asci clavate; spores very large, at length pale brown, constricted in the middle, with a double hyaline border, 0.00086 in. broad, 0.018–0.0224 in. long.

**Northern** Island: Auckland, on bark, *Knight.*

*β. Spores usually 3-septate.*

9. **V. nitida**, *Schrad.*;—*Bab. in Fl. N. Z. ii. 307.* Thallus determinate, somewhat tartareous, continuous, smooth, waxy-brown, marked with minute pale dots and swellings. Apothecia rather large, hemispherical, black,

immersed, at length partially exposed; spores dark brown, fusiform-ellipsoid, with 4 minute cells.—Nyland. Exp. Syn. Pyren. 45.

Var. *pseudo-nitidella*, Knight, l. c. t. 11. f. 6. Thallus ferruginous, effuse. Apothecia small, naked.

**Northern and Middle Islands:** Bay of Islands, on hark, *J. D. H.* (Cosmopolite.)

Var. *pseudo-nitidella*, Auckland, on hark, *Knight*; Otago, *Lindsay*.

10. **V. glabrata**, *Ach.* Thallus effuse, white or evanescent. Apothecia dimidiate, somewhat prominent, in other respects as in *V. nitida*.—Nyland. Exp. Syn. Pyren. 47.

Var. *α*. Knight l. c. t. 11. f. 7. Thallus white or waxy, effuse or limited. Apothecia large, naked or veiled by the epidermis.

Var. *β. cinereo-alba*, Knight and Mitt. l. c. Thallus membranous, ashy-white, contiguous. Apothecia small, hemispheric at first, covered by the thallus; spores 2-seriate.

Var. *γ. deprimens*, Knight, l. c. t. 11. f. 8. Thallus ashy, effuse. Apothecia entire or dimidiate; spores sometimes 1–2-septate; upper cell much the largest.

Var. *δ. homalisma*, Knight, l. c. t. 11. f. 9. Thallus yellow-brown, effuse, smooth. Apothecia very large, quite flat, entire, widely spreading.

**Northern and Middle Islands:** probably common, from Auckland, on bark, *Knight*, to Otago, *Lindsay*. (Europe, etc.)

*γ. Spores many-celled or muricate.*

11. **V. moniliformis**, *Knight*, l. c. t. 11. f. 10. Thallus olive-green, effuse, unequal. Apothecia entire, sinuate or superficial, spreading at the base; nucleus subglobose, yellow; asci cylindric; spores 7-septate, brown, ellipsoid; nucleoli often moniliform.

**Northern Island:** Auckland, on hark, *Knight*.

12. **V. deliquescens**, *Knight*, l. c. t. 11. f. 11. Thallus effuse, yellow, glabrous. Apothecia more or less hid by the epidermis, entire, thick, spreading at the base; spores somewhat curved, 1-septate or 10-nucleolate, brown; nuclei lenticular-elliptic, often deliquescent.

**Northern Island:** Auckland, on bark, *Knight*.

13. **V. pyrenastroides**, *Knight*, l. c. t. 11. f. 12. Thallus yellow or grey, effuse. Apothecia entire, confluent, more or less hidden by the epidermis, at length exposed; ostioles distinct, surrounded by a pale areola; spores elliptic-oblong, large, brown, many celled, 8–10-annulate; rings formed of quadrate cells.

**Northern Island:** Auckland, on bark, *Knight*.

14. **V. cellulosa**, *Knight*, l. c. t. 11. f. 13. Thallus effuse, olive-green. Apothecia excessively minute, entire, cellular, superficial; nucleus grey-black; asci subrotund; spores large, elliptic-oblong, 2-seriate, brown, muricate.

**Northern Island:** Auckland, on bark, *Knight*.

15. **V. Haultaini**, *Knight*, l. c. t. 11. f. 14. Thallus olive-green or ochraceous, unequal, effuse. Apothecia excessively minute, immersed, when moist dimidiate; nucleus globose; asci clavate; spores large, subclavate, muricate, 0.00025 in. broad, 0.0009 long.

**Northern Island:** Auckland, on hark, *Knight*.

Dr. Lindsay, in his 'Catalogue of Otago Lichens,' enumerates *V. pallida*, *Ach.*

## ORDER VIII. FUNGI.

Cellular plants, composed of short or long cells or filaments, variously combined, usually growing on decayed or living substances, or in earth impregnated with organic matter. Fructification of spores, that are either naked or enclosed in membranous tubes (*asci*), then called *sporidia*, or terminating filaments or spicular cells (*sporophores* or *basidia*). Spores germinating by elongation of the outer covering or protrusion of the lining membrane. Fungi absorb oxygen and exhale carbonic acid, like animals, and abound like them also in nitrogen.

A vast, complicated, and varied Order, approaching Lichens through *Peziza*, *Sphæria*, and other *Ascomycetes*, and differing from *Algæ* chiefly in growing upon land, in deriving their nourishment through rooting filaments, and in their chemical constituents.

The species hitherto collected in New Zealand give a most imperfect idea of the extent, variety, and structural characters of this vast Order, which are of themselves the study of a lifetime. New Zealand no doubt contains several thousand species.

A multitude of terms have been applied to designate the various modifications of the organs of growth, vegetation, and reproduction of Fungi. I have reduced them to a minimum here, and doubt not they might be still further reduced with advantage. The most useful may be thus defined:—Fungi have no root proper, but usually have a *mycelium*, which consists of branching or simple white or dark filaments, that ramify through the ground, deriving nourishment from it (as the spawn of mushrooms), or in dead wood, hastening its decay, or in living animal and vegetable tissues; these mycelia usually produce chemical change (fermentation, etc.) where they are developed. The “Dry-rot,” the “Vinegar-plaut,” the “Yeast-plant,” “Amadou,” and the white spreading fibrous growths found in cellars and pits, are all mycelia of various Fungi. When the mycelium casts off fine matted filaments, it is called “*byssoid*.”

The surface on which the mycelium or Fungus grows, is called the *matrix*.

The unusual terms applied to the forms of Fungi are:—*determinate*, when the form is defined; *effuse*, when spread over the matrix; *emergent* or *erumpent*, when developed below the cuticle or bark of a plant and bursting through it; *immersed*, when sunk in the matrix; *resupinate*, when, as it were, turned upside down, the hymenium being upwards,—a term applied only to those tribes in which it is normally downwards.

When the substance of the Fungus forms a sort of amorphous mass, in which closed sacs containing the spores are sunk, it is called a *stroma*.

In the more perfect determinate-formed Fungi, the fructification is spread over the surface and exposed; the fructifying surface is then called *hymenium*, and the layer beneath it the *hymenophorum*; sometimes this *hymenium* is spread over both surfaces of thin membranous plates, or the surfaces of pores, as in mushrooms, Polypori, etc., when the intermediate substance of such plates, etc., is called a *trama*.

The *hymenium* may consist of spicular cells (*basidia* or *sporophores*) tipped by spores; or of *asci*, containing *sporidia*, exactly as in Lichens; or of a nucleus or *capillitium* of mixed filaments and spores.

When the hymenium or spores are enclosed in proper membranes, these are called *perithecia* or *peridia*; the former generally applying to separate sacs imbedded in a common stroma, the latter to a membrane covering the whole Fungus.

When the fruit-bearing portion of the Fungus takes a definite shape, different from and usually larger than the stem, it is called a *pileus*, as the cap of a mushroom.

For all we know of the fungology of New Zealand, we are indebted to the Rev. M. J. Berkeley, the most eminent English author, who worked up this Order for the Floras of the Antarctic Expedition. From that of New Zealand, the following descriptions are chiefly compiled, and I am further indebted to that gentleman's good offices for revising this compilation from his own labours.

The principal books that should be procured to pursue this difficult study, are Berkeley's

'Introduction to Cryptogamic Botany' and 'Outlines of British Fungi,' and Fries's 'Epicrisis.' A good compound microscope is essential, as also some skill as a dissector and draughtsman, to make any progress.

# SYNOPSIS OR KEY TO THE SUBORDERS, TRIBES, AND GENERA.

**SUBORDER I. HYMENOMYCETES.**—Hymenium exposed, consisting of closely packed cells, of which the fertile (sporophores) bear naked, usually 4-nate spores on distinct spicules.

**TRIBE I. Agaricini.** *Hymenium on the under surface of a pileus, spread over the surface of radiating flat gills. (Mushrooms, toadstools, etc.)*

The most highly organized Fungi, of very various form and consistence, usually of considerable size and definite shape; but presenting every variation from the symmetrical mushroom and woody *Polyporus*, to the incoherent shapeless gelatinous mass of *Tremella*.

## *a. Pileus fleshy; gills soft, brittle.*

1. **AGARICUS.** Gills membranous, persistent.
2. **COPRINUS.** Gills membranous, deliquescent.

## *β. Pileus fleshy; gills coriaceous.*

3. **HYGROPHORUS.** Hymenium waxy.
4. **MARASMIUS.** Hymenium dry, extending over gills and their interstices.
5. **LENTINUS.** Gills toothed or lacerate.
6. **SCLEROMA.** Gills entire; trama indistinct.
7. **PANUS.** Gills unequal, entire; trama distinct, fibrous.

## *γ. Pileus hard or tough.*

8. **SCHIZOPHYLLUM.** Gills splitting longitudinally.
9. **LENZITES.** Gills anastomosing behind.

**TRIBE II. Polyporei.** *Hymenium on the under surface of a pileus, lining the cavity of tubes or pores, which are sometimes broken up into teeth or concentric plates.*

10. **POLYPORUS.** Pores minute at first. Contiguous walls separable.
11. **DÆDALEA.** Pores labyrinthiform.
12. **FAVOLUS.** Pores large at first. Contiguous walls inseparable.

**TRIBE III. Hydnei.** *Hymenium on the under surface of the pileus, spread over the surface of spines or papillæ, not lining pores or tubes.*

13. **HYDNUM.** Spines more or less conical, short or elongated.
14. **IRPEX.** Spines flat, more or less divided, connected at the base.

**TRIBE IV. Auricularini.** *Hymenium on the under surface of the pileus, which is, however, often resupinate, at first even or rarely veined and commonly remaining so, or forming obscure folds or granulations, not prickly or tubular.*

15. **THELEPHORA.** Pileus coriaceous, of matted fibres, without cuticle.
16. **STEREUM.** Pileus coriaceous, with an adherent cuticle.
17. **CORTICIUM.** Pileus fleshy, swollen when moist.
18. **CYPHELLA.** Pileus submembranous, cup-shaped.
19. **GUEPINIA.** Pileus gelatinous, swelling when moist.

**TRIBE V. Clavariiei.** *Erect Fungi, usually terete or clavate. Hymenium vertical, scarcely distinct from the hymenophorum, extending over the apex of the plant, even, or at length wrinkled.*

20. **CLAVARIA.** Substance fleshy.
21. **PISTILLARIA.** Substance waxy, finally hoary; cellular internally.



TRIBE VI. **Tremellini.** *Gelatinous Fungi, with sometimes a more solid nucleus, variously shaped, often lobed, convolute or discoid; sporophores large, simple or divided. Spicules elongated into threads, which are not compacted into a true hymenium.*

22. **HIRNEOLA.** Substance tough, externally hispid.

SUBORDER II. **GASTEROMYCETES.**—Hymenium concealed within the substance of the plant, exposed only by the rupture or decay of its walls (*peridium*), consisting of closely-packed cells, of which the fertile bear naked spores on distinct spicules.

A large suborder, of high development, remarkable for the drying up of the hymenial tissues of many, whence their cavities contain a dusty mass of spores. Spiral threads occur, mixed with the spores, of some.

TRIBE VII. **Phalloidei.** *Young pileus enclosed in a gelatinous stratum, and this in a globular volva, which bursts irregularly and exposes it. Hymenium deliquescent. (Fetid Fungi.)*

23. **ASEROE.** Pileus cylindric, branching at the summit into forked horizontal rays, sheathed with the volva at its base.

24. **ILEODICTYON.** Pileus forming a globular reticulated branched network, the branches tubular.

TRIBE VIII. **Trichogastres.** *Usually globose dry Fungi. Hymenium enclosed in a single or double coat (peridium), at length drying up into a dusty mass of microscopic threads and spores (capillitium). (Chiefly terrestrial, puff-balls, etc.)*

25. **SECOTIUM.** Pileus subglobular, stalked; stalk sheathed with the volva at the base.

26. **PAUROCOTYLIS.** Globose. Peridium of closely interwoven flocci.

27. **GEASTER.** Peridium splitting into reflexed segments.

28. **TRICHOSCYTALIS.** Cylindric. Outer peridium hard, surrounding the base of the capillitium with a volva.

29. **BOVISTA.** Globose. Peridium like parchment, cracking off in large flakes.

30. **LYCOPERDON.** Globose or pyriform. Peridium papery, persistent, warted or tubercled towards the apex.

31. **SCLERODERMA.** Subglobose. Peridium corky, bursting by an indefinite aperture.

TRIBE IX. **Myxogastres.** *Usually minute Fungi, pulpy when young, of various forms. Peridium usually globose, single or double, containing a dusty mass of flocci, mixed with spores.*

32. **ÆTHALIUM.** Indeterminate, adnate, globose or oblong, pulpy masses. Outer peridium floccose.

33. **DIDERMA.** Minute. Peridium globose, double, outer polished.

34. **DIDYMIUM.** Minute. Peridium subglobose, single, outer furfuraceous.

35. **STEMONITIS.** Minute. Peridium globose or cylindric, single, evanescent, traversed by the stipes.

TRIBE X. **Nidulariacei.** *Peridium of various forms, bursting at the apex horizontally, containing separate sporangia, in which the spores are formed.*

36. **CYATHUS.** Peridium of 3 membranes.

37. **CRUCIBULUM.** Peridium of a uniform spongy consistence.

SUBORDER III. **CONIOMYCETES.**—Very minute Fungi, including rusts, bunt, smut, various mildews, etc. Hymenium 0. Spores abundant, conspicuous, often large, surrounded by a perithecium or naked, terminating inconspicuous threads. Threads often arising from a creeping mycelium. Peridium (*perithecium*) when present very delicate and evanescent.

This suborder is distinguished by the relative predominance of the reproductive bodies, which are very fugacious and soil the hand. It contains many obscure and most curious plants, whose development and organization have taxed the skill and patience of the most eminent naturalists. Some species present different forms, arising from different forms of spore; some are supposed to originate infectious diseases in the animal kingdom; others attack and destroy living plants.

TRIBE XI. **Sphærone mei.** *Perithecium more or less distinct.*

- 38. LEPTOSTROMA. Perithecium thin, falling off by a transverse rupture.
- 39. PHOMA. Perithecium punctiform or pustular, with a minute orifice. Spores minute, simple.
- 40. HENDERSONIA. Perithecium subglobose. Spores 2-multiseptate.
- 41. ARCHERSONIA. Perithecium fleshy, lobed, multicellular. Spores simple or septate.
- 42. PHLYCTENA. Perithecium spurious; spores very slender, on short sporophores.
- 43. PILIDIUM. Perithecium flat, shield-like, smooth, variously ruptured. Spores linear, sessile.
- 44. ASTEROMA. Perithecia arising from creeping filaments, flat, with no determinate orifice.

TRIBE XII. **Torulacei.** *Perithecium altogether wanting. Spores compound, moniliform or arising from repeated division, rarely reduced to a single cell.*

- 45. GYMNOSPORIUM. Spores superficial, conglobate.

TRIBE XIII. **Pucciniæi.** *Parasitic on living plants. Peridium 0. Spores producing secondary spores in germination, usually oblong and septate.*

- 46. PUCCINIA. Spores naked, 1-septate, on a distinct peduncle.
- 47. UREDO. Spores sessile, each contained in a cavity of a multicellular stroma.
- 48. UROMYCES. Spores stalked, each contained in a cavity of a multicellular stroma.
- 49. USTILAGO. Spores deep-seated, simple, on delicate threads, or breaking up into a powdery mass.

TRIBE XIV. **Æcidiacei.** *Peridium distinctly cellular. Mycelium traversing the tissues of living plants.*

- 50. ÆCIDIUM. Peridium bursting open. Spores concatenate.

SUBORDER IV. **HYPHOMYCETES.**—Filamentous or floccose Fungi. Filaments naked, simple or branched, free or united below so as to form a distinct stem with free branches. Spores terminating the filaments.

Most of the species of this vast tribe come under the common term of *moulds*, whose ravages no animal or vegetable matter escapes. Coincident with their attack a chemical change takes place in the substance attacked, known as fermentation. They are developed with extreme rapidity, and are often poisonous. The various mildews of the Vine, Hop, and silkworm belong here, as do the potato disease, and *oidium* of the grape.

TRIBE XV. **Stilbacei.** *Stem or stroma compound. Spores collected into a globose head, usually terminating a distinct stalk, subgelatinous, diffuent.*

- 51. STILBUM. Stem firm, long. Head globose, deciduous. Spores small, involved in gluten.
- 52. EPICOCCUM. Head subglobose, studded with large spores.

TRIBE XVI. **Dematiei.** *Filaments free, more or less corticated and carbonized. Spores often compound and cellular.*

- 53. CŒDEMIUM. Filaments free, dark, flexuose, with reticulate large spores on their sides.
- 54. MACROSPORIUM. Filaments slender, evanescent. Spores erect, stipitate, multi-septate.

55. CLADOSPORIUM. Filaments flexible, branched, jointed. Spores short and septate.

TRIBE XVII. **Mucedines.** *Filaments not coated with a membrane, distinct, white or coloured. Spores mostly simple.*

The moulds which belong to this tribe have never been collected in New Zealand.

TRIBE XVIII. **Sepedonie.** *Spores collected on a floccose mycelium, very abundant. Fertile filaments scarcely distinct from the mycelium.*

56. SEPEDONIUM. Spores large, simple, globose or appendiculate.

TRIBE XIX. **Trichodermacei.** *Spores enclosed within or covered by a floccose mycelium, which at length bursts.*

57. PILACRE. Stipes solid. Heads of flexuose, branched threads. Spores forming a dusty mass.

SUBORDER V. ASCOMYCETES.—Fruit consisting of asci, containing spordia, and springing from a naked or enclosed nucleus or hymenium, which is often spread over a receptacle.

Morels and Truffles belong to this tribe, and are doubtless to be found in New Zealand, as is *Cyttaria*, a curious genus found on Beech-trees in Tasmania and Fuegia, but not hitherto in these islands.

TRIBE XX. **Elvellacei.** *Substance soft, fleshy or waxy. Hymenium more or less exposed.*

58. LEOTIA. Receptacle pileate, stipitate, covered everywhere with the smooth rather viscid hymenium.

59. GEOGLOSSUM. Receptacle clavate. Hymenium surrounding the club.

60. PEZIZA. Receptacle cup-shaped, its disk naked. Asci fixed.

61. PATELLARIA. Receptacle patellæform, margined. Hymenium dusty from the spores breaking up.

62. CENANGIUM. Receptacle coriaceous, at first closed, then open and margined, covered with a thick cuticle.

TRIBE XXI. **Phacidiacei.** *Perithecium coriaceous or carbonaceous; outer coat or perithecium bursting and exposing the disk, which is surrounded by an obtuse or inflected margin.*

63. HYSTERIUM. Perithecium labiate; border entire; orifice narrow. Asci elongate.

64. AIOGRAPHIUM. Perithecium branched; orifice narrow. Asci subglobose.

65. ASTERINA. Perithecium suborbicular, in a byssoid mycelium, splitting irregularly. Asci short.

66. EXCIPULA. Perithecium carbonaceous, spherical; mouth orbicular; nucleus gelatinous.

TRIBE XXII. **Sphæriacei.** *Perithecium carbonaceous or membranous, pierced at the apex. Hymenium diffuent. Asci usually springing from the walls.*

67. CORDICEPS. Stroma vertical, erect, coriaceous or fleshy. Receptacle distinct. Spordia submoniliform.

68. HYPOCREA. Stroma horizontal. Perithecia tender, hyaline or coloured.

69. XYLARIA. Stroma vertical, fleshy or corky, with a black or rufous bark. Receptacle stipitate.

70. HYPOXYLON. Stroma brittle or corky, flat or convex, at first clothed with a floccose veil, then with a black crust. Perithecia vertical or divergent.

71. DIATRYPE. Stroma confluent with the matrix. Perithecia sunk, elongated into a distinct neck.

72. DOTHIDEA. Stroma with globose cavities containing nuclei, which have a decided neck and papillæform aperture. Perithecium 0.

73. *NECTRIA*. Stroma 0, or bearing the naked coloured perithecia on its surface.

74. *SPHERIA*. Stroma 0. Perithecia black, pierced at the apex, superficial or erumpent.

75. *CAPNODIUM*. Mycelium of black, branched, jointed filaments. Perithecia elongate, of confluent filaments, with often free tips.

76. *MICROPELITIS*. Perithecium free, carbonaceous, flattened, dimidiate, scutate. Asci clavate. Sporidia septate.

76. *PEMPHIDIUM*. Perithecia spurious, convex, black, formed of the epidermis. Nucleus gelatinous. Asci perfect. Sporidia elongate.

TRIBE XXIII. **Perisporiacei**. *Perithecia free, subglobose, always closed, except when decaying, membranous or carbonaceous. Nucleus never diffuent. Asci springing from the base.*

77. *ERYSIPHE*. Mycelium cobwebby. Perithecia soft; appendages floccose, simple or branched.

78. *CHÆTOMIUM*. Perithecium thin, brittle. Asci linear, with dark mostly lemon-shaped sporidia.

79. *MELIOLA*. Perithecia carbonaceous, from a strigose mycelium. Asci broad.

SUBORDER VI. **PHYSOMYCETES**.—Filaments free or slightly matted, bearing vesicles which contain indefinite sporidia.

To this tribe belong the true moulds (*Mucor*, etc.) of which species must occur abundantly in New Zealand, though they have never been collected. *Antennaria* is an anomalous member of it.

TRIBE XXIV. **Antennariæi**. *Filaments black, matted, often moniliform.*

80. *ANTENNARIA*. Filaments articulated. Walls of sporangia mostly cellular. Spores chained together, immersed in gelatinous pulp.

## 1. AGARICUS, L.

Fleshy putrescent Fungi. Hymenium inferior, spread over the surface of membranous persistent gills, formed of closely-packed cells. Gills radiating from the centre of a pileus, with shorter ones between, formed of 2 separate membranes, their edges acute. Substance of the gills internally filamentous, continuous with that of the pileus.

An immense ubiquitous genus, containing upwards of 1000 species, including the Mushroom, Toadstool, etc. The species are very variable and difficult to determine from dried specimens; they should be drawn, coloured, and described when gathered, dried by slicing, and the colour of the spores noted.

### KEY TO THE SUBGENERA.

#### Series I. **Leucospori**. *Spores white.*

Subgenus I. **AMANITA**. Pileus central. Young plant enclosed in a membranous free volva, through which the pileus pushes. Fully-formed plant with a veil extending from the circumference of the pileus to near the top of the stem. Gills not decurrent on the stem.

Subgenus II. **LEPIOTA**. Pileus central. Veil enclosing the young plant, connate with the cuticle of the pileus; when burst, leaving a ring on the middle of the stem. Gills not decurrent on the stem.

Subgenus III. **TRICHOLOMA**. Pileus central. Veil obsolete or floccose, and adherent to the circumference of the pileus. Stem fleshy. Gills emarginate behind, not decurrent on the stem.



Subgenus IV. *CLITOCYBE*. Pileus central. Veil 0. Gills more or less decurrent on the stem. Stem elastic, with a fibrous outer coat.

Subgenus V. *OMPHALIA*. Pileus central. Veil 0. Gills aduate and decurrent. Stem cartilaginous.

Subgenus VI. *PLEUROTUS*. Pileus excentric, unequal or lateral. Stem 0 or solid and firm. Gills acute behind, unequal.

Series II. **Dermini.** *Spores rusty-coloured, tawny or brownish (not purple-brown nor pink).*

Subgenus VII. *PHOLIOTA*. Veil dry, forming a ring round the more or less scaly stem. Gills unequal, juiceless.

Subgenus VIII. *HEBELOMA*. Veil, when present, floccose, not interwoven. Stem fleshy. Gills sinuated.

Subgenus IX. *FLAMMULA*. Veil fugacious. Stem fleshy, firm, fibrillose. Gills adnate or decurrent.

Subgenus 10. *GALERA*. Veil floccose, fugacious. Stem slender, cartilaginous externally. Pileus campanulate; margin straight. Gills adnate.

Series III. **Pratella.** *Spores purple-brown or pink-brown.*

Subgenus 11. *PSALLIOTA*. Stem with a ring formed by the veil.

Subgenus 12. *HYPHOLOMA*. Veil forming a fugacious web, that adheres to the circumference of the pileus.

1. **A. (Amanita) phalloides**, *Fries*;—*Berk. in Fl. N. Z.* ii. 173. Pileus at first campanulate, viscid when moist, often green; margin even, regular. Volva free above, bulbous. Gills rounded, ventricose.—*Berk. Outlines*, 89. t. 3. f. 1.

**Northern Island**: in woods, *Colenso*. (Europe.)

2. **A. (Lepiota) clypeolarius**, *Bull.*;—*Berk. in Fl. N. Z.* ii. 173. Sweet-scented. Pileus fleshy, umbonate, white pink red brown or yellow; surface at first even, then scaly. Stem fistulose, the ring floccose and scaly. Gills free, approximate.—*Berk. Outlines*, 94.

**Northern Island**: on the ground, *Colenso*. (Europe.)

3. **A. (Lepiota) exstructus**, *Berk. in Fl. N. Z.* ii. 173. Pileus campanulate, fleshy, 1 in. high and 2 across or more; surface broken up into warts, each of which is clothed at the top with an angular portion of smooth cuticle. Stem nearly equal, 3 in. high, not penetrating the substance of the pileus; ring superior. Gills narrow, very distant.

**Northern Island**: Bay of Islands, on the ground, *J. D. H.*—A beautiful species.

4. **A. (Tricholoma) brevipes**, *Bulliard*;—*Berk. in Fl. N. Z.* ii. 173. Pileus fleshy, at first rigid, then soft smooth; umbo evanescent. Stem solid, firm, rigid, very short, rather thickened below, brown. Gills crowded, ventricose, brownish, then dirty white.

**Northern Island**: on the ground, *Colenso*. (Europe.)

5. **A. (Tricholoma) cartilagineus**, *Bulliard*. Cartilaginous, elastic, brittle. Pileus fleshy, convex, gibbous, undulated, smooth; cuticle cracked, finely dotted with black. Stem stout, equal, stuffed, striate, rather mealy. Gills adnate, slightly emarginate, crowded, pallid.—*Berk. Outlines*, 101.

**Middle Island**: Beech forests, amongst moss, *Haast*. (Europe.)

6. **A. (Tricholoma) carneus**, *Bulliard*. Pileus rufous-pink, fleshy, obtuse, even, nearly smooth, becoming pale. Stem short, axis stuffed, rigid, reddish, thickened upwards, pruinose. Gills very wide behind, rounded, crowded, white.—*Berk. Outlines*, 103.

**Middle Island**, *Sinclair and Haast*. (Europe.)

7. **A. (Clitocybe) infundibuliformis**, *Schæffer*;—*Fl. N. Z.* ii. 173. Pileus usually pale reddish, fleshy, convex, then broadly funnel-shaped, umbonate, clothed with minute down, flaccid. Stem soft, elastic, axis stuffed. Gills decurrent, white, moderately distant.—*Berk. Outlines*, 110.

**Northern Island**: on the ground, *Colenso*. (Europe.)

8. **A. (Omphalia) pyxidatus**, *Bulliard*. Pileus red-grey, at first umbilicate, then funnel-shaped, watery when fresh; margin striate. Stem even, at length fistulose. Gills decurrent, rather distant, narrow, reddish-grey.—*Berk. Outlines*, 131.

*β. hepaticus*, liver-coloured.—*Berk. in Fl. Antart.* 169.

**Lord Auckland's group**, *J. D. H.*—Specimens very imperfect and identification doubtful.

9. **A. (Omphalia) Colensoi**, *Berk. in Fl. N. Z.* ii. 173. Small. Pileus  $\frac{1}{2}$  in. across, smooth, minutely striate when dry, deeply umbilicate; margin involute. Stem  $\frac{1}{2}$ – $\frac{3}{4}$  in. high, slender, narrowed downwards, furfuraceous, at length smooth. Gills moderately broad, decurrent.

**Northern Island**: on sand, logs, etc., *Colenso*.

10. **A. (Omphalia) umbelliferus**, *Linn.*;—*Berk. in Fl. N. Z.* ii. 173. Pileus variable in colour, membranous, plano-convex, obconic, brittle, radiato-striate, pale when dry, even, slightly silky; margin first inflexed, crenate. Stem equal, downy below. Gills very distant, thick, decurrent, very broad behind.—*Berk. Outlines*, 132.

**Northern Island**: on the ground, *J. D. H.*, *Colenso*. (Europe and other countries.)

11. **A. (Pleurotus) novæ-Zelandiæ**, *Berk. in Fl. N. Z.* ii. 174. Pileus gelatinous and thin, watery when fresh,  $2\frac{1}{2}$  in. broad, white, flabellate, reniform, fixed by the elongated vertex, which forms a little round disk, smooth in front, minutely scabrous behind. Stem obsolete. Gills broad, distant, thin, interstices veiny.

**Northern Island**: on dead wood, *Colenso*.

12. **A. (Pleurotus) cocciformis**, *Berk. in Fl. N. Z.* ii. 174. Minute. Pileus  $\frac{1}{2}$ – $\frac{1}{6}$  in. broad, at first cup-shaped, then reflexed, thickly clothed with fawn-coloured hairs. Stem 0. Gills narrow, setulose, pale tan-coloured.

**Northern Island**: on dead wood, *J. D. H.*

13. **A. (Pholiota) erebius**, *Fries*;—*Berk. in Fl. N. Z.* ii. 174. Gregarious, fragile. Pileus thin and fleshy, rugulose, lurid, striate at the margin. Stem smooth, hollow, pale; veil subcampanulate. Gills rather distant, adnate.

**Northern Island**: on the ground, *Ahuriri, Colenso*. (Europe.)

14. **A. (Pholiota) adiposus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 174.

Gregarious, yellow. Pileus compact, plano-convex, obtuse, glutinous, rough, with evanescent concentric darker scales, as is the stem, which is somewhat bulbous below; axis stuffed. Gills adnate, broad, yellow, then ferruginous.—Berk. Outlines, 151. t. 8. f. 2.

**Northern Island:** Cape Turnagain, on trees, *Colenso*. (Europe.)

15. **A. (Hebeloma) strophosus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 174. Pileus fleshy, convex, rather flattened; disk darker, subumbonate, silky towards the even margin. Stem hollow, short, equal silky, with a floccose ring at the apex. Gills adnexed, then free, crowded, ventricose, pallid, then of a watery cinnamon.

**Northern Island:** grassy spots, Wairarapa, *Colenso*. (Europe.)

16. **A. (Flammula) sapineus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 174. Pileus fleshy, yellowish, plano-convex, even. Stem subsolid, striate, pale. Gills dirty white or yellowish or tawny-cinnamon.

**Northern Island:** on dead Coniferæ, *Colenso*. (Europe.)

17. **A. (Psalliota) campestris**, *Linn.*;—*Berk. in Fl. N. Z.* ii. 174. Pileus fleshy, plano-convex, dry, floccose or scaly. Stem even, white; axis stuffed; ring about the middle, torn. Gills free, approximate, ventricose, subdeliquescent, flesh-coloured, then brown.—Berk. Outlines, 165. t. 10. f. 2.

**Northern Island:** on the ground, *Colenso*. (The common "mushroom," found in all parts of the world.)

18. **A. (Psalliota) arvensis**, *Schæffer*;—*Berk. in Fl. N. Z.* ii. 174. Pileus fleshy, obtusely conico-campanulate, then expanded, at first floccose, then smooth, even or cracked. Stem hollow, with floccose pith; ring broad, pendulous, double, outer split into rays. Gills free, wider in front, dirty white. Stem brown, tinged with pink.—Berk. Outlines, 166. t. 10. f. 4.

**Northern Island:** on the ground, *Colenso*. (Common.) Grows in rings (fairy rings). Edible.

19. **A. (Psalliota) campigenus**, *Berk. in Fl. N. Z.* ii. 174. Small. Pileus 1 in. high, campanulate, obtuse, silky, with a few scattered scales, rather fleshy, reddish when dry. Stem  $1\frac{1}{2}$  in. high,  $\frac{1}{6}$  thick, thickened at the base, slightly furfuraceous; ring broad, near the top. Gills rather narrow, attenuated behind, adnexed or adnate. Spores pale red-brown, obliquely obovate.

**Northern Island:** on the ground amongst grass, *Colenso*.

20. **A. (Psalliota) semiglobatus**, *Batsch*. Pileus slightly fleshy, hemispherical, even, glutinous and yellowish. Stem slender, smooth, straight, fistulose, glutinous, yellowish. Gills broad, adnate, plane, clouded with black.—Berk. Outlines, 169.

**Middle Island:** on dung, *Sinclair and Haast*. (Europe.)

21. **A. (Hypholoma) fascicularis**, *Hudson*; *Berk. in Fl. N. Z.* ii. 175. Bitter. Pileus fleshy, yellow within, thin, subumbonate, smooth. Stem hollow, thin, flexuose, fibrillose, yellow. Gills adnate, very crowded,

linear, subdeliquescent, sulphur-coloured, then greenish.—Berk. Outlines, 169. t. ii. f. 1.

**Northern** Island: on the ground, *Colenso*. (Europe, Tasmania.)

22. **A. (*Hypholoma*) *stuppeus***, Berk. in *Fl. N. Z.* ii. 175. Pileus 2 in. broad and more, fleshy, convex, expanded, clothed with towy fascicled fibrous scales especially towards the margin. Stem  $1\frac{1}{2}$  in. high,  $\frac{1}{3}$  in. thick, fibrillose, thickened at the base, and attached to abundant mycelium. Gills crowded, moderately broad, adnate, umber.

**Northern** Island: on the ground, *Colenso*.

23. **A. (*Hypholoma*) *appendiculatus***, Bulliard;—Berk. in *Fl. N. Z.* ii. 175. Pileus between fleshy and membranous, ovate, expanded, smooth, watery when fresh, wrinkled and sparkling with atoms when dry; margin fringed by the remains of the veil. Stem fistulose, equal, smooth, white, pruinose above. Gills somewhat adnate, crowded, dirty white, then rosy-brown.—Berk. Outlines, 170. t. ii. f. 3, 4.

**Northern** Island: on decayed stumps, *Colenso*. (Europe.)

## 2. **COPRINUS**, Persoon.

Habits and characters of *Agaricus*, but the gills deliquesce, and are membranous. Spores black.

Egacious toadstools, growing on rotten wood and manured soil, etc.

1. **C. *Colensoi***, Berk.;—*Fl. N. Z.* ii. 175. Small, subfascicled; stem slender,  $\frac{1}{4}$ — $\frac{3}{4}$  in., tomentose. Pileus snow-white, cylindric, obtuse, at length campanulate, furfuraceous. Gills linear. Spores small, oblong,  $\frac{1}{3}\frac{1}{5}\frac{1}{6}$  in. long.

**Northern** Island, *Colenso*, on dung, very near the European *C. niveus*.

2. **C. *finetarius***, Fries. Stem solid, scaly, thickened at the base. Pileus submembranous, clavate-conic, soon torn and revolute, at first rough with floccose scales, then naked, longitudinally cracked, even at the apex. Gills free, black, lanceolate, linear and flexuose.—Berk. Outlines, 179.

**Middle** Island: Canterbury province, on dungheaps, *Sinclair and Haast*. (Europe, and almost ubiquitous.) Very variable.

## 3. **HYGROPHORUS**, Fries.

Habit, etc., of *Agaricus*. Pileus fleshy; hymenophorum continuous with the stem, descending without change into the sharp-edged gills; hymenium waxy.

A considerable European etc. genus.

1. **H. *cyaneus***, Berk. *ms.* Azure blue. Stem 4–5 in. high, stout, nearly  $\frac{1}{2}$  in. diam., irregularly hollow, thickened at the base. Pileus  $1\frac{1}{2}$  in. high, 2 in. diam., conic acuminate. Gills broad, very obtuse in front, narrowed posteriorly.

**Middle** Island: beech forests, amongst moss, Nelson Province, *Haast* (drawing only). A very fine species.



4. **MARASMIUS**, Fries.

Habit, etc., of *Agaricus*. Pileus fleshy or membranous; hymenium dry, extending over both gills and their interstices. Gills thick, tough, coriaceous, edge acute.

A large European and exotic genus.

1. **M. caperatus**, *Berk. in Hook. Kew Journ. Bot.* iii. 44;—*Fl. N. Z.* ii. 175. Snow-white, delicate, inodorous. Stem short, furfuraceous. Pileus 1–1½ in. broad, membranous, plicate and corrugate, smooth. Gills distant, broad, adnate.

**Northern** Island: on dead wood, Wairarapa, *Colenso*. (Himalaya mountains.)

5. **LENTINUS**, Fries.

Habit, etc., of *Agaricus*. Pileus fleshy or leathery, or hard. Gills tough, with toothed or lacerated acute edges; hymenium of the same consistence as the stem.

A large genus, especially in warm countries.

1. **L. novæ-Zelandiæ**, *Berk.*;—*Fl. N. Z.* ii. 176. Subimbricated, small. Stem obsolete. Pileus thin, brown, 1 in. broad and upwards, flabelliform suborbicular or reniform, clothed behind with velvety olive down. Gills narrow, thin, decurrent behind, of the same colour as the pileus; edges thin, torn.

**Northern** Island: on dead wood, *Colenso*. M. Haast sends a sketch of a very different and much larger species, but indeterminable.

6. **SCLEROMA**, Fries.

Characters of *Lentinus*, but the edges of the gills are quite entire. Trama indistinct.

Tropical and subtropical Fungi, growing on dry soil in patches.

1. **S. pygmæum**, *Berk. in Fl. N. Z.* ii. 176. Small, dirty white. Stem 1–2 in. high, very slender, powdery, rooting, reddish. Pileus 1 in. diam., umbilicate, thin, glabrous, striate. Gills rather distant, decurrent far down the stem, interstices smooth.

**Northern** Island: Tehawera forests, on decayed logs, *Colenso*. The smallest species of the genus.

7. **PANUS**, Fries.

Pileus tough but fleshy, drying up. Gills tough, unequal, with quite entire acute edges. Trama distinct, fibrous.

A considerable tropical and temperate genus, distinguished from *Scleroma* by the fibrous trama.

1. **P. stypticus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 176. Stem short, thick, lateral, dilated upwards. Pileus reniform, coriaceous; cinnamon-coloured, vinous when young; surface breaking up into mealy scales. Gills

determinate, thin, crowded, connected by veins; cinnamon-coloured.—Berk. Outlines, 217.

**Northern** Island: common on dead wood, *Colenso*. (Europe, etc.)

2. **P. maculatus**, *Berk. in Fl. N. Z.* ii. 176. Closely imbricate. Stems connate, scarcely visible. Pileus broad, reniform, convex, fleshy, at first tomentose, then breaking up into reflexed scales, at length smooth; margin slightly involute. Gills rather distant, broad, decurrent, crisped when dry; margin entire; spores white, oblong,  $\frac{1}{3000}$  in. long.

**Northern** Island: on dead trunks, *Colenso*.

### 8. SCHIZOPHYLLUM, Fries.

Pileus hard, dry. Gills coriaceous, branched in a flabellate manner, longitudinally splitting along the trama, the divisions becoming revolute.

Chiefly a tropical genus, abounding on dead trunks.

1. **S. commune**, *Fries*;—*Berk. in Fl. N. Z.* ii. 177. Pileus adnate behind, simple and lobed. Gills grey, then brownish-purple, the divided surface villous.—Berk. Outlines, 228.

Abundant on dead wood. (Ubiquitous.)

### 9. LENZITES, Fries.

Pileus corky or coriaceous. Gills firm, often anastomosing, and forming spurious pores; edge entire.

A common tropical and temperate genus.

1. **L. repanda**, *Fries*. Pileus plane, corky, very broad, zoned, smooth, pallid, whitish; margin curved. Gills anastomosing, crowded, somewhat toothed.

**Northern** Island: on dead wood, *J. D. H.*

### 10. POLYPORUS, Fries.

Fleshy, coriaceous, or woody Fungi, often projecting horizontally from the trunks of decaying trees, consisting of a stalked or sessile pileus, which is usually marked with concentric rings on the upper surface and studded with pores on the lower, sometimes the pileus is adnate to the wood by one surface. Hymenium concrete with the substance of the pileus, consisting of subrotund pores with thin simple dissepiments. Hymenophorum descending into the trama of the pores, which are not easily if at all separable, and changed with them into a distinct substance.

A very large genus found in all parts of the world. The species are extremely variable in form and size, and are difficult of definition.

#### KEY TO THE SECTIONS.

A. **FAVOLUS**. Pores large, 4–6-angled, like honeycomb.

B. **MICROPORUS**. Pores minute, rounded.

1. *Mesopus*. Stem distinct, simple, lateral or nearly central. Substance corky or fleshy.
2. *Pleuropus*. Stem lateral, simple, substance hard.
3. *Merisma*. Stem etc. more or less divided.
4. *Apus*. Pileus sessile, lateral.
5. *Resupinatus*. Pileus resupinate, effuse; pores on various surfaces.

1. **P. (Favolus) arcularius**, *Fries*;—*Berk. in Fl. N. Z.* ii. 177. Pileus yellowish, corky; margin deflexed, hispid. Stem central, smooth. Pores rhomboid, white.

**Northern** Island: on dead wood, *Sinclair, Colenso*. (Europe.)

2. **P. (Mesopus) oblectans**, *Berk.*;—*Fl. N. Z.* ii. 177. Pileus thin, coriaceous, depressed,  $1\frac{1}{2}$  in. diam., incised, repand, zoned especially towards the centre, strigose-striated, shining, cinnamon-coloured. Stem central, velvety, red-brown. Pores small, toothed, cinnamon-coloured.

**Northern** Island: on the ground, *Colenso*. (Swan River, Tasmania.)

3. **P. (Mesopus) lucidus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 177. Pileus corky, flabelliform, grooved and rugose, yellow, then blood-red and chesnut, varnished. Stem lateral. Pores minute, white, long, determinate.—*Berk. Outlines*, 240. t. 16. f. 2.

**Northern** Island: on dead wood, *Colenso*. (Ubiquitous.)

4. **P. (Pleuropus) phlebophorus**, *Berk. in Fl. N. Z.* ii. 177. t. 105. f. 3. Small, white. Pileus flabellate, contracted at the top into a short stem, glabrous, veined, undulate; cuticle gelatinous. Pores minute, subirregular, with thin toothed dissepiments.

**Northern** Island: on dead wood, *Tehawera, Colenso*.

5. **P. (Pleuropus) xerophyllus**, *Berk. in Fl. N. Z.* ii. 178. t. 105. f. 2. Pileus flabellate, 1 in. across, suborbicular, brown, with a strong rufous tinge, marked with raised radiating lines and small wrinkles, minutely scabrous; margin thin, crenate. Stem  $\frac{1}{3}$  in. long, black, rugose, minutely velvety. Pores white, just visible; dissepiments variable in thickness; edges rather obtuse.

**Northern** Island: on dead wood, *Colenso*.

6. **P. (Merisma) Colensoi**, *Berk. in Fl. N. Z.* ii. 178. Much branched, 1 foot across. Stem distinct, slender, elongated, repeatedly dichotomous. Pilei very numerous, flabellately expanded, depressed above, brownish, nearly smooth, with a few raised lines. Pores pale, decurrent, often much elongated; dissepiments thin; edges very acute, often toothed, sublamellæform.

**Northern** Island: forests of *Tehawera, Colenso*.

7. **P. (Apus) adustus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 178. Pileus fleshy, tough, firm, thin, villous, ashy; margin straight, at length black, effuso-reflexed behind. Pores short, minute, round, obtuse, dirty white and powdery, then cinereous-brown.—*Berk. Outlines*, 243.

**Northern** and **Middle** Islands: on dead wood, *Colenso, Lindsay*. (Europe, etc.)

8. **P. (Apus) dichrous**, *Fries*;—*Berk. in Fl. N. Z.* ii. 178. Imbricate, white, very effuse. Pileus fleshy, tenacious, soft, reflexed, silky, obsoletely zoned. Pores short, equal, rounded, obtuse, cinnamon-brown.

**Northern** Island: on dead wood, *J. D. H., Colenso*.

9. **P. (Apus) igniarius**, *Fries*;—*Berk. in Fl. N. Z.* ii. 179. Perennial. Mycelium and spores white. Pileus even, often resupinate, flocculent, substance hard and thick, opaque, ferruginous, changing to brownish-black; margin rounded, surface uneven, flesh zoned. Pores very minute, first whitish, then cinnamon-coloured, convex.—*Berk. Outlines*, 246.

**Northern** Island: trunks of trees, Bay of Islands, *J. D. H.* (Europe, etc.)

10. **P. (Apus) salicinus**, *Fries*;—*Berk. in Fl. N. Z.* ii. Large, perennial, often resupinate, very effuse. Pileus woody, very hard, undulate, smooth; margin short, obtuse, spreading, cinnamon, then brown; crust black. Pores very small, round, ferruginous and cinnamon.—*Berk. Outlines*, 246.

**Middle** Island: Dusky Bay, *Menzies*. (Europe and various countries.)

11. **P. (Apus) iridioides**, *Berk.*;—*Fl. N. Z.* ii. 179. Large. Pileus hard, between woody and corky, reniform, convex above, flat below, cinnamon-coloured, obscurely zoned, ferruginous-grey, rhubarb-coloured within, minutely rugulose; margin velvety; behind very scabrous, with elongate bristly nodules. Pores very minute, punctiform.

**Northern** Island: Bay of Islands, on wood, *J. D. H.* (South Africa, Australia.)

12. **P. (Apus) scruposus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 178. Pileus corky, subtriquetrous, rough with little points, zoneless, reddish-grey, at length sulcate near the margin; substance rhubarb-coloured. Pores minute round, equal, ferruginous.

**Northern** Island: on dead wood, *Colenso*. (Europe.)

13. **P. (Apus) plebeius**, *Berk. in Fl. N. Z.* ii. 179. Pale, imbricate. Pileus corky, 2 in. across, dimidiate, pulvinate, zoneless externally and internally, usually even, minutely pubescent, rigid, under surface concave; margin obtuse. Pores minute, punctiform; edges obtuse.

**Northern** Island: on wood, *Colenso*. (A var. with acute margins is found in the Himalayas.)

14. **P. (Apus) australis**, *Fries*;—*Berk. in Fl. N. Z.* ii. 179. Pileus very hard, woody, plano-convex, tuberculate and undulate, glabrous, brownish-black, under surface concave, with a broad poreless band. Pores minute, rounded, equal, obtuse, whitish.

**Northern** Island: on dead wood, *J. D. H.* (Pacific Islands.)

15. **P. (Apus) hemitrephius**, *Berk. in Fl. N. Z.* ii. 179. Pileus firm, corky, zoned, ungulate, with 2 or 3 deep, concentric furrows, minutely tomentose, within zoned, wood-coloured, tawny beneath the hardened cuticle; under surface concave, white. Pores punctiform, substratified.

**Northern** Island: on trunks of trees, *Colenso*.



16. **P. (Apus) borealis**, *Fries*. Imbricate. Pileus white, at length yellowish, between fibrous and corky, thick, convex above, flat below, velvety. Pores slender, rounded, white, forming long tubes; edges lacerate.

**Middle Island**: Otago, *Lindsay*. (Europe.)

17. **P. (Apus) hirsutus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 179. White. Pileus coriaceous, corky, often imbricate, reniform, almost plane on both surfaces, strigose, zoned. Pores equal, white internally, obtuse, brown or ashy externally.

**Northern Island**: on dead wood, *J. D. H., Colenso*. (Europe.)

18. **P. (Apus) velutinus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 179. White, at length yellowish. Pileus corky-coriaceous, flat on both surfaces, velvety, slightly zoned; margin acute, attenuated. Pores minute, round, white, equal.—*Berk. Outlines*, 248.

**Northern Island**: on dead wood, *Colenso*. (Europe, America.)

19. **P. (Apus) versicolor**, *Fries*;—*Berk. in Fl. N. Z.* 179. White yellowish or ashy-blue, tufted, subimbricate. Pileus thin, coriaceous, rigid, flattened, depressed behind, velvety, shining in parts, variegated with different-coloured zones. Pores minute, round; dissepiments acute, torn, white, at length pallid.—*Berk. Outlines*, 248.

**Northern Island**: on rotten logs, *Colenso*. (Ubiquitous.)

20. **P. (Apus) tabacinus**, *Montagne*;—*Berk. in Fl. N. Z.* ii. 178. Imbricate, rusty-brown. Pileus thin, coriaceous, rigid, effuse, reflexed, shell-like, tomentose, zoned; margin acute, pale. Pores middling-sized; dissepiments toothed and lacerate.

**Northern Island**: on dead wood, *J. D. H., Colenso*. (Chili, Juan Fernandez.)

21. **P. (Apus) cinnabarinus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 179. Cinnamon-red. Pileus subcoriaceous or corky, thickish, slightly convex, obsoletely zoned, rugulose, when young pubescent. Pores rounded, conspicuous.

**Northern Island**: on dead wood, *J. D. H., Colenso*. (Europe, N. America.)

22. **P. (Apus) sanguineus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 178. Shining, vermilion-red. Pileus subreniform, coriaceous, thin, obsoletely zoned, flat, glabrous. Pores very minute, vanishing towards the margin.

**Northern and Middle Islands**, *J. D. H., Lindsay*. (America, Tasmania, S. Africa.)

23. **P. (Resupinatus) catervatus**, *Berk. in Fl. N. Z.* ii. 180. *t.* 105. *f.* 1. Forming dull white patches of small laterally confluent stipitate pilei, which form together a flat thin stratum. Pileus rather membranous, silky; margin often lobed. Pores small, irregular; dissepiments thin, toothed.

**Northern Island**: on *Podocarpus spicata*, Bay of Islands, *Colenso*. A very curious species.

23. **P. (Resupinatus) leucoplacus**, *Berk. in Fl. N. Z.* ii. 180. White, effused. Pileus nearly smooth, thin, rigid; margin free. Pores

small, punctiform; dissepiments thick, with flattened obtuse pulverulent edges.

**Northern** Island: on sticks, *Colenso*.

24. **P. (Resupinatus) diffusus**, *Berk. in Fl. N. Z.* ii. 180. Bright red, effuse, at length tearing away from the matrix, and leaving part of its substance behind. Pores small; edges thin, membranous, slightly toothed.

**Northern** Island: on charred wood, *Colenso*. Probably an imperfect form.

25. **P. (Resupinatus) vaporarius**, *Fries;—Berk. in Fl. N. Z.* ii. 180. Firm, persistent, with difficulty torn away, thin, dry, whitish; mycelium creeping in the tissue of the wood. Pores large, angular, white, crowded into a close firm persistent stratum; edges torn.—*Berk. Outlines*, 252.

**Northern** Island: on dead wood, *Colenso*. (Europe, Tasmania.)

## 11. DÆDALEA, Persoon.

Habits of *Polyporus*. Hymenophorum descending unchanged into the trama. Pores, when fully formed, torn, toothed or labyrinthiform.

A large genus, both tropical and temperate.

1. **D. confragosa**, *Pers.;—Fl. N. Z.* ii. 180. Stem 0. Pileus between corky and coriaceous, somewhat zoned, scabrous, brownish-red, subferruginous within. Hymenium porous, at length reddish-brown, labyrinthiform and torn.—*Berk. Outlines*, 254.

**Northern** Island: Bay of Islands, on dead wood, *J. D. H.* (Europe, etc.)

2. **D. pendula**, *Berk. in Fl. N. Z.* ii. 181. *t.* 105. *f.* 4. Stem 0. Pileus imbricate, coriaceous,  $1\frac{1}{2}$  in. long, 1 in. broad, pendulous, pocket-shaped, attached by the back and vertex, pale reddish-grey, sparingly zoned, clothed with short strigose matted brown hairs; margin tomentose. Hymenium tinged with lilac and red-grey. Pores sparing, irregular, with finely setulose tooth-like septa.

**Northern** Island: on dead wood, *Colenso*. Berkeley remarks that the hymenium is more that of a *Radulum*.

## 12. FAVOLUS, Fries.

Habit of *Polyporus*. Pileus fleshy, flexible. Hymenium reticulated, cellular, alveolate. Pores radiating, elongated, formed by densely anastomosing laminae with double walls.

A small tropical genus, allied closely to *Polyporus*, but the pores are large from the first, not minute and afterwards dilating.

1. **F. intestinalis**, *Berk. in Hook. Kew Journ. Bot.* iii. 167; *Fl. N. Z.* ii. 181. White, turning olive- or dirty yellow in drying. Pileus thin, soft, subreniform, lobed, narrowed into an obsolete stem, almost transparent when dry. Pores hexagonal,  $\frac{1}{4}$  in. diam. Spores white, broadly elliptic, with a small nucleus.

**Northern Island:** on dead wood amongst moss, *Colenso*. A singular plant, resembling a piece of tripe when fresh, probably esculent. (Himalaya mountains.)

### 13. HYDNUM, Linn.

Habit of *Polyporus*. Pileus fleshy, coriaceous, or hard. Hymenium of the same substance as the pileus, spread over the surface of awl-shaped or compressed spines that are free at the base.

A large genus, especially in hot climates. Some species are esculent, and excellent when cooked.

1. **H. clathroides**, *Pallas*;—*Fl. N. Z.* ii. 181. Much branched from the base, ashy-grey, soft; branches anastomosing, above muricate and papillose, beneath covered with long crowded filiform spines.

**Northern Island:** Manawata (on *Knightia*), *Colenso*. Specimens imperfect, and identification hence doubtful; nat. name, "Pekepeke Rione" (*Col.*).

2. **S. scopinellum**, *Berk. in Fl. N. Z.* ii. 181. Widely effuse, white; spines tomentose at the base, pencilled at the tips.

**Northern Island:** on dead wood, *Colenso*.

### 14. IRPEX, Fries.

Habit of *Polyporus*, and intermediate in character between it and *Hydnum*. Hymenium at first toothed; teeth firm, subcoriaceous, acute, disposed in rows, or like network, connected together at the base by porose or plaited folds.

A small temperate genus.

1. **I. brevis**, *Berk. in Fl. N. Z.* ii. 181. Loosely distantly imbricate; stem 0; mycelium forming patches on bark. Pileus dimidiate, pendulous,  $\frac{1}{2}$  in. long, 1 in. broad, at first white, then red-brown, somewhat zoned, slightly rugose, fibrillous; teeth elongate, compressed, often again toothed.

**Northern Island:** dead bark, Bay of Islands, *J. D. H.*

### 15. THELEPHORA, Fries.

Pileus without a cuticle, consisting of matted fibres. Hymenium tough, at length rigid, finally collapsing and flocculent, costate, striate, or papillose.

A very large genus, especially in temperate climates.

1. **T. vaga**, *Berk. in Fl. N. Z.* ii. 182. Resupinate; mycelium forming stringy reticulated patches on wood. Hymenium pale clay-coloured, pulverulent but not setulose.

**Northern Island:** on dead wood, *Sinclair*.

2. **T. pedicellata**, *Schwein.*;—*Fl. N. Z.* ii. 182. Widely effused, of a byssoid texture, tawny-cinnamon; margin waved white, rooting beneath, blackish from scattered papillae.

**Northern Island:** Bay of Islands, *Colenso, J. D. H.*—A curious plant which, as Mr. Berkeley observes, may easily be taken for a Lichen.

## 16. STEREUM, Fries.

Pileus coriaceous, sometimes velvety, with an adherent cuticle. Hymenium coriaceous, rather thick, concrete with the middle stratum of the pileus, even, veinless, unchangeable.

A large chiefly tropical genus, of which some species are also found in temperate climates.

1. **S. Sowerbei**, *Berk. in Fl. N. Z.* ii. 182. Corky, pale, dull, not shining, gregarious. Stem distinct, rather villous. Pileus funnel-shaped, lacerate, fimbriate, scaly, beneath smooth.—*Helvella pannosa*, Sowerby. *Thelephora*, Fries.

**Northern** Island: on the ground, *Colenso*. (Europe, Tasmania.)

2. **S. lobatum**, *Kunze*;—*Berk. in Fl. N. Z.* ii. 183. Pileus coriaceous, rigid, undulated, villous, light red, marked with red-brown smooth zones. Hymenium even, smooth, somewhat cinnamon-coloured.

**Northern** and **Middle** Islands: on dead wood, *J. D. H.*, etc. (Tasmania.)

3. **S. cinereo-badium**, *Fries*;—*Berk. in Fl. N. Z.* ii. 183. Pileus dimidiate, sessile, robust, coriaceous, tomentose, margined, chesnut-brown; zones smooth, black. Hymenium smooth, glaucous, flesh-coloured.

**Northern** Island: on dead wood, *Colenso*. (S. America.)

4. **S. vellereum**, *Berk. in Fl. N. Z.* ii. 183. Adnate to dead twigs, dirty white, border free, broad, lobed, ochreous, zoned above, clothed with coarse towy fibres; edge ciliated. Hymenium ochraceous, smooth.

**Northern** and **Middle** Islands: on twigs, *Colenso*; *Lyall*.

5. **S. hirsutum**, *Fries*;—*Berk. in Fl. N. Z.* ii. 183. Pileus coriaceous, effused, reflexed, strigose-hirsute, somewhat zoned, turning pallid; margin obtuse, yellow. Hymenium even, smooth, naked, juiceless, bright tawny yellow, unchanged when bruised.—*Berk. Outlines*, 270. t. 17. f. 7.

**Northern** and **Middle** Islands: on dead wood, *J. D. H.*, *Lindsay*. (Europe.)

6. **S. phæum**, *Berk. in Fl. N. Z.* ii. 183. Pileus zoned, 1–2 in. broad, sessile, dimidiate, rather coriaceous, thin, dark bay, clothed with short matted hairs. Hymenium zoned, bay, with a ferruginous bloom, setulose.

**Northern** Island: on dead wood, *J. D. H.*—A very beautiful species.

7. **S. rugosum**, *Fries*;—*Berk. in Fl. N. Z.* ii. 183. Pileus corky, rigid, effuse and shortly reflexed, obtusely margined, velvety, at length smooth, bright brown. Hymenium dull, pruinose, blood-stained when wounded.—*Berk. Outlines*, 271.

**Northern** Island: on dead wood, *Colenso*. (Europe.)

8. **S. papyrinum**, *Mont.*;—*Berk. in Fl. N. Z.* ii. 183. Pileus very thin, between coriaceous and papery, very broad, effuse, reflexed, strigose-hirsute, ashy, concentrically furrowed; margin acute, fulvous. Hymenium umber-purple, with a velvety pubescence.

**Northern** Island: on dead wood, *Colenso*. (Cuba.)



9. **S. latissimum**, Berk. in *Fl. N. Z.* ii. 183. Forming broad very thin chalk-white patches, minutely submentose; margin abrupt.

**Northern** Island: on bark of trees, *Sinclair*.

## 17. CORTICIUM, Fries.

Coriaceous or fleshy moist Fungi, spreading over dead wood in patches; margin free, often fringed with filaments (byssoid). Hymenium soft, swollen, undulate and papillose when moist, collapsing when dry, then even, often rimose, never flocculent and deliquescent.

A large genus, chiefly confined to temperate regions of the globe, difficult of determination because of their texture and often imperfect development.

1. **C. læve**, Fries;—Berk. in *Fl. N. Z.* ii. 184. Membranous, smooth, pale, effuse, villous beneath; circumference byssoid, not radiating. Hymenium even, smooth, pinkish and livid.—Berk. *Outlines*, 273.

**Northern** Island: on twigs and dead bark, *Colenso*. (Europe, Tasmania.)

2. **C. viride**, Berk. in *Fl. N. Z.* ii. 184. Olive-green, crustaceous, effuse, cracked; margin very thin, membranous, scarcely byssoid, livid. Hymenium cracked. Spores large, elliptic or subglobose.

**Northern** Island: on bark and dead wood, *Colenso*.

3. **C. tenerum**, Berk. in *Fl. N. Z.* ii. 184. Effuse, resupinate, at first even, partly brown with a vinous tint, then cracked into areolæ with often defined borders; margin very narrow, not distinctly byssoid.

**Northern** Island: on bark of *Knightia*, *Colenso*.

4. **C. polygonium**, Fries;—Berk. in *Fl. N. Z.* ii. 184. Patches adnate, determinate, hard, cartilaginous, flesh-coloured or rich red-brown, covered with large polygonal crowded tubercles; margin concolorous. Hymenium continuous, red, coated with meal.—Berk. *Outlines*, 276.

**Northern** Island: on dead wood, *Colenso*. (Europe, N. America.)

5. **C. rhabarbarinum**, Berk. in *Fl. N. Z.* ii. 184. Effuse, resupinate, forming a tawny uniform stratum; margin paler, delicately and shortly byssoid. Hymenium even, not cracked, distinctly setulose.

**Northern** Island: on bark, *Colenso*.

6. **C. ochroleucum**, Fries. Coriaceous-membranaceous, flaccid, effuso-reflexed or resupinate, silky; zones and thin margin at length smooth. Hymenium smooth, yellowish, at length cracked.

**Middle** Island: Otago, *Lindsay*. (Europe, Tasmania.)

## 18. CYPHELLA, Fries.

Pileus submembranous, cup-shaped, elongated at the point of attachment behind, often pendulous. Hymenium distinctly inferior, completely confluent with the pileus.

A small genus, resembling *Peziza*, but distinguished by having sporophores and not asci.

1. **C. densa**, *Berk. in Fl. N. Z.* ii. 184. Patches of numerous fascicled pendulous elongated fawn-coloured bodies, attached by a narrow apex. Pileus pruinose, pubescent above, the pubescence consisting of short obtuse flocci. Hymenium of the same colour, even.

**Northern Island**: on live bark of *Corynocarpus*, Cape Kidnapper, *Colenso*.

## 19. GUEPINIA, Fries.

Pileus between cartilaginous and gelatinous, folded and twisted, swelling when moist. Hymenium distinct, inferior or at first superior, unchanged, persistent.

Handsome tropical and temperate Fungi, intermediate between *Tremellini* and *Auricularini*.

1. **G. spathularia**, *Fries;—Fl. N. Z.* ii. 185. Very delicate, gelatinous, caespitose, suberect. Pileus dimidiate-spathulate, and stem pubescent and glaucous. Hymenium orange-yellow, plaited.

**Northern Island**: on logs of wood, *Colenso*. (N. America.)

2. **G. pezizæformis**, *Berk. in Fl. N. Z.* ii. 185. Minute, bright orange-red. Stem short. Pileus lateral, externally and stem minutely velvety. Hymenium obliquely cup-shaped, slightly lobed, sparingly wrinkled and pitted within. Spores oblong, sometimes curved.

**Northern Island**: Bay of Islands, on dead wood, *J. D. H.*—Habit of a *Peziza*. (Australia, Tasmania.)

## 20. CLAVARIA, Linn.

Herby, terete or clavate, simple or branched erect Fungi, without a distinct stem. Hymenium dry.

A vast temperate and tropical genus of Fungi, readily recognized by their forming straight, fleshy, variously coloured, erect, finger-shaped bodies.

1. **C. lutea**, *Vittadini;—Berk. in Fl. N. Z.* ii. 185. Yellow. Stem thick, repeatedly divided above dichotomously, ultimate division acute, subfastigate.

**Northern Island?**, on the ground, *Bidwill*. (Europe.)

2. **C. Pusio**, *Berk. in Fl. N. Z.* ii. 185. Stem  $1\frac{1}{2}$  in. high, slender, thickened above, divided into a few acute cylindrical ascending branches about as long as the stem, and making an acute angle with each other; branches rarely subdivided (rufous when dry).

**Northern Island**: on the ground, *Colenso*.

3. **C. flagelliformis**, *Berk. in Fl. N. Z.* ii. 186. About 2 in. high, divided from the base; branches forming a fastigate flagelliform mass, clongate, acute, cylindric, forked; tips undivided.

**Northern Island**: Bay of Islands, on the ground, *J. D. H.*

4. **C. arborescens**, *Berk. in Fl. N. Z.* ii. 186. About 2 in. high, scattered, bright amethyst when fresh. Stem slender, 1 in. high, simple,

slightly thickened upwards, spreading into a few forked branches that bear fastigiate branchlets at their tips.

**Northern Island**: Bay of Islands, on the ground, *Colenso*.

5. **C. flaccida**, *Fries*;—*Bab. in Fl. N. Z.* 186. Slender, flaccid, ochraceous, much branched; stem smooth; branches crowded, unequal, converging, acute.—*Berk. Outlines*, 230.

**Northern Island**: on dead leaves and twigs, *Colenso*. (Europe.)

6. **C. crispula**, *Fries*;—*Berk. in Fl. N. Z.* ii. 186. Much branched, tan-coloured, then ochraceous; stem slender, villous, rooting; branches flexuous, multifid; branchlets concolorous, divaricate.—*Berk. Outlines*, 281.

**Northern Island**: on rotten wood, *Colenso*. (Europe.)

7. **C. Colensoi**, *Berk. in Fl. N. Z.* ii. 186. Small, 1 in. high, attached by towy fibres; stem mostly compressed, branched from the base; branches repeatedly forked to the apex, very acute, subfastigiate, delicate.

**Northern Island**: on dead wood, *Colenso*.

8. **C. inæqualis**, *Fries*;—*Berk. in Fl. N. Z.* ii. 186. Yellow, brittle, gregarious, subfasciculate; stem simple, bearing numerous simple or forked clubs.—*Berk. Outlines*, 282.

**Northern Island**: on the ground, Bay of Islands, *J. D. H.* (Europe, Tasmania.)

## 21. PISTILLARIA, Fries.

Club-shaped, erect Fungi, pink, waxy, becoming horny; cellular internally. Hymenium even.

A considerable genus, in all climates.

1. **P. ovata**, *Fries*;—*Fl. N. Z.* ii. 186. Small, white, obovate, hollow; stem very short, pellucid, sometimes lobed.

**Northern Island**: on dead stems of herbaceous plants, *Colenso*. (Europe.)

## 22. HIRNEOLA, Fries.

Gelatinous, cup-shaped or ear-shaped Fungi, horny when dry, velvety externally. Hymenium often more or less wrinkled, even, without papillæ.

A small genus, found in various climates.

1. **H. auricula-Judæ**, *Berk.* Thin, concave, flexuous, at length black, veined and plaited externally and internally, tomentose beneath.—*Berk. Outlines*, 289. t. 18. f. 7.

**Northern Island**: Auckland, *Sinclair*. (Cosmopolite.)

2. **H. polytricha**, *Mont.* Subhemispherical, cup-shaped, expanded, lobed, densely villous externally with grey hairs, disk purplish-brown.—*Mont. Sylloge*, 181.

**Northern Island**: Waikehi, in damp places, *Milne*. (East Indies, Java.)

3. **H. hispidula**, *Berk. in Ann. Nat. Hist.* iii. 396.—*Exidia*, *Fl. N. Z.*

ii. 187. Globose-campanulate, oblique, brown-black, externally fawn-coloured, clothed with short bristly down.

**Northern** and **Middle** Islands: common on trunks of trees, especially overhanging water. (S. America, Mauritius.)

### 23. ASEROE, Labill.

Volva globose, gelatinous within. Pileus stalked, divided at the summit into long radiating simple entire or forked horizontal arms. Hymenium at the base of the arms.

A curious genus, the arms of whose pileus somewhat resemble a star-fish. Found in New Zealand, Ceylon, and Australia.

1. **A. rubra**, Labill. *Fl. N. Holl.* ii. ;—*Berk. in Fl. N. Z.* ii. 187. 2 to 4 in. high; stem as thick as the thumb, even. Rays of the pileus about 8, bright red, long, subulate, 1–2 in. long, split to the base, continuous with the stem, not divided from them by a deep groove.—*Berk. in Hook. Lond. Journ. Bot.* iii. 192. t. 5 A.

**Northern** and **Middle** Islands: probably common, Auckland and Nelson, *Sinclair, Haast.* (Australia.)

2. **A. Hookeri**, *Berk. in Fl. N. Z.* ii. 187. t. 105. f. 13. Much smaller than *A. rubra*, about 1 in. high, dark green or red. Stipes  $\frac{1}{2}$  in. thick, corrugated. Rays of the pileus about 8, split to beyond the middle, divisions filiform, subulate, separated from the stipes by a deep groove.—*A. viridis*, *Berk. in Hook. Lond. Journ. Bot.* iii. 192. t. 5 B.

**Northern** Island: clay banks, Bay of Islands, *J. D. H., Colenso.*

### 24. ILEODICTYON, Tulasne.

Volva globose, gelatinous internally. Pileus forming a globose network of anastomosing soft corrugated branches, which are hollow internally. Hymenium adhering to the inner walls of the network.

A genus of 2 or 3 species, found in Australia, New Zealand, and Chili. The volva is esculent, and was much used by the natives.

1. **I. cibarium**, *Tulasne*;—*Berk. in Fl. N. Z.* ii. 188. Branches of the network stout, corrugated.

**Northern** and **Middle** Islands: on the ground, probably common, *Raoul*, etc.

2. **I. gracile**, *Berk.* Branches of the network slender, smooth and even.

**Middle** Island: Otago, *Lindsay.* (Australia, Tasmania.)—Much smaller than *S. cibarium*.

### 25. SECOTIUM, Kunze.

Volva clothing the whole pileus, at length bursting away from it. Pileus stipitate, hollow, bearing a subglobose or conical hymenium on its apex, which is internally full of labyrinthiform cells.



A very small genus, found in various countries, one is European. An Australian one is edible.

1. **S. erythrocephalum**, *Tulasne*;—*Berk. in Fl. N. Z.* ii. 187. Stem glabrous, white or reddish. Pileus globose, umbonate, plicate below, scarlet.—*Tulasne in Ann. Sc. Nat.* ser. 3. ii. 115, and iv. t. 9. f. 5–17.

**Northern** and **Middle** Islands: common in grassy places, *Raoul*, etc.

2. **S. lilacensis**, *Berk. mss.* Azure-blue. Stem short, pale, fibrous, pruinose. Pileus subglobose, lilac-coloured, spotted,  $\frac{1}{2}$  in. high.

**Middle** Island: drift-wood, Buller river, *Haast*. (Drawing only.)

## 26. PAUROCOTYLIS, Berk.

Globose. Peridium simple, thin, hard, rigid, consisting of compactly interwoven flocci; nucleus formed of a floccose mass of loosely interwoven membranous bodies, enclosing flexuose sinuses. Spores large, pedicelled, seated on the surface of the sinuses.

A very singular monotypic Fungus.

1. **P. pila**, *Berk. in Fl. N. Z.* ii. 188. t. 105. f. 9. Crimson or globular, sessile, somewhat sinuated, contracted and waved when dry. Spores pale, tan-colour in mass,  $\frac{1}{1250}$  in. diam., endochrome with a globose nucleus.

**Northern** Island: on the ground, Tehawera, *Colenso*. (Only one specimen seen.)

## 27. GEASTER, Micheli.

Globose. Peridium double, persistent, the outer splitting from the base to the apex into longitudinal segments, which are spread out like a star, or are turned back, supporting the nucleus, which bursts by a terminal pore.

A common genus of Puff-balls.

1. **G. fimbriatus**, *Fries*;—*Berk. in Fl. N. Z.* ii. 188. Outer peridium multifid, expanded, flaccid, inner sessile; mouth of nucleus indeterminate, fimbriate and pilose.—*Berk. Outlines*, 300. t. 20. f. 4.

**Northern** Island: on the ground, *Colenso*.

## 28. TRICHOSCYTALE, Corda.

An erect cylindric Fungus. Outer peridium between woody and corky, rugose, at first globose and enclosing the inner, which is floccose, and bursts through it; inner tubular, enveloping a cylindrical mass of vertical flocculent filaments mixed with spores.

A most remarkable monotypic Fungus.

1. **T. paradoxa**, *Corda*;—*Berk. in Fl. N. Z.* ii. 189. Sulphur-coloured, gregarious, about 1 in. high.—*Trichocoma paradoxum*, *Junghuhn Præmissa*, p. 9.

**Northern** Island: Bay of Islands, on dead wood, *J. D. H.* (Himalaya, Java, Carolina.)

29. **BOVISTA**, Dillenius.

Globose puff-balls, often of great bulk. Peridium double, persistent, like paper or pasteboard, forming a distinct bark, which shells off from the nucleus (capillitium). Nucleus composed of a mass of brown filaments attached to the peridium and pedicelled spores.

Universally distributed; the young of various species are eatable sliced and cooked.

1. **B. brunnea**, *Berk. in Fl. N. Z.* ii. 189. Globose, 1 in. diameter, attached by a central point, opening by a narrow aperture; outer peridium papery, subsinuate, evanescent; inner brownish-umber; capillitium and spores olive-brown.

**Northern** Island: Manawata river, *Colenso*, amongst moss.

30. **LYCOPERDON**, Tournefort.

Globose or obovoid or pyriform puff-balls. Peridium membranous, evanescent or flaccid above, forming a persistent bark, which breaks up into scales or warts. Nucleus (capillitium) soft, dense, compact below, adnate to the peridium and base of the Fungus internally.

A very large and widely diffused genus, the young of which are excellent eating when sliced and cooked.

1. **L. giganteum**, *Batsch*. Usually very large. Peridium obtuse and brittle above, cracking, areolate, evanescent, opening widely; bark floccose, rather distinct; nucleus disappearing with the olive spores.—*Berk. Outlines*, 302.

**Middle** Island: Otago, *Lindsay*. (Europe.)

2. **L. Fontanesei**, *Durieu and Léveillé*;—*Berk. in Fl. N. Z.* ii. 189. Very large, turbinate. Peridium areolate, with depressed stellate warts on the areolæ, rupturing. Nucleus with forked flocci and minute sessile spores.

**Northern** Island: Waihake, on the ground, *Colenso*. (Algeria.)—Called by the natives "Pukuvau."

3. **L. cælatum**, *Fries*;—*Berk. in Fl. N. Z.* ii. 190. Large, obovoid. Peridium flaccid above, collapsing, obtuse, bursting at the apex, at length open and cup-shaped. Barren stratum cellular; nucleus distinct all round. Spores dingy yellow.—*Berk. Outlines*, 302. t. 20. f. 7.

**Northern** and **Middle** Islands: on the ground, *Colenso*, *Lindsay*. (Europe, etc.)—Forming fairy rings.

4. **L. pusillum**, *Fries*;—*Berk. in Fl. N. Z.* ii. 190. Small. Peridium entirely flaccid, persistent, obtuse, bursting by a narrow aperture; bark even, then cracked, with appressed scales; barren stratum obsolete, continuous with the nucleus. Spores olive.—*Berk. Outlines*, 302.

**Northern** Island: on the ground, *Colenso*. (Europe, Java, etc.)

5. **L. novæ-Zelandiæ**, *Léveillé*;—*Berk. in Fl. N. Z.* ii. 190. Globose, sessile, papery, thin, fragile; bark white, shining, sprinkled with gra-

nular warts, plaited and laciniose at the base; mouth wide. Nucleus and spores violet.

**Middle Island:** Akaroa, *Raoul*.—Mr. Berkeley, who has not seen this, observes that, according to the description, it much resembles *Bovista fragilis*, Vitt.

6. ***L. reticulatum***, Berk. in *Fl. N. Z.* ii. 190. Globose, 1 in. or more diameter, narrowed below into a short stem. Peridium finely reticulated, at length smooth and shining; orifice small, irregular, terminal. Nucleus olive, at length bleached and french-grey; barren stratum confluent with the nucleus.

**Northern Island:** on the ground, *Colenso*.

7. ***L. microspermum***, Berk. in *Fl. N. Z.* ii. 190. Subglobose, obtuse,  $\frac{1}{3}$ –1 in. diameter, reddish-brown. Peridium all flaccid, persistent, obscurely cracked, rough with minute scales, at length pale, smooth below; mouth small, circular. Nucleus uniform, green; barren stratum very small. Spores globose, minute.

**Northern Island:** on the ground, *Colenso*. (Himalaya, Java, etc.)

8. ***L. gemmatum***, *Fries*;—Berk. in *Fl. N. Z.* ii. 190. Subglobose, sessile or narrowed at the base. Peridium membranous, persistent; bark farinaceous, adnate, covered with spinulose warts; mouth umbonate. Nucleus with a sort of central columella. Spores yellow or greenish.—Berk. Outlines, 302.

**Northern Island:** on the ground, Tehawera, *Colenso*. (Europe, Tasmania.)

9. ***L. pyriforme***, *Schæffer*;—Berk. in *Fl. N. Z.* ii. 190. Pyriform. Peridium membranous, persistent, umbonate; bark not separable, covered with minute fugacious scales. Nucleus greenish-yellow, with a conical columella.—Berk. Outlines, 303.

**Northern Island:** on decayed wood, *Colenso*. (Europe, Java, etc.)

### 31. SCLERODERMA, Persoon.

More or less globose, sessile or substipitate Fungi. Peridium firm, hard, with an innate bark, bursting irregularly. Nucleus (capillitium) with flocci adhering on all sides to the peridium and forming distinct veins in the central mass of spores. Spores large, granulated.

A widely diffused genus. In a young state some species are subterranean, and mistaken for Truffles.

1. ***S. Geaster***, *Fries*;—*Fl. N. Z.* ii. 190. Subglobose, unequal, as large as the fist, pale. Peridium bursting at top in a stellate manner. Nucleus dirty-blue. Sporidia brown.

**Northern Island:** Bay of Islands, *J. D. H.* (Europe, N. America, Australia.)

2. ***S. vulgare***, *Fries*;—*Fl. N. Z.* ii. 190. Irregular, nearly sessile. Peridium corky, bursting by an indefinite aperture. Nucleus bluish-black.—Berk. Outlines, 303. t. 15. f. 4.

**Northern Island:** on the ground, *Colenso*. (Europe.)

32. **ÆTHALIUM**, Link.

Subglobose or oblong, sessile, amorphous, simple or lobed, pulpy Fungi. Peridium indeterminate, outer layer forming a floccose, evanescent bark, fragile, internally divided into cells by membranous strata of confluent interwoven flocci.

A curious plant; common on rotten wood, tan, etc., often inside houses, and very destructive of hothouse timber.

1. **Æ. septicum**, *Fries*;—*Fl. N. Z.* ii. 191. Forming simple or lobed patches, one or more inches long; colour variable, yellow, violet, etc.

**Northern** Island: on dead wood, moss, etc., common, *Colenso*, etc. (Ubiquitous.)

33. **DIDERMA**, Persoon.

Usually minute, globose, sessile or stalked Fungi, found on bark, wood, mosses, etc. Peridium double; outer membranous or crustaceous, glabrous, polished, fragile, dehiscent; inner membranaceous, evanescent. Nucleus (capillitium) of flocci, adnate at the base, or fixed to a central columella, traversing the mass of spores in all directions.

A large and common genus, in all parts of the world.

1. **D. Hookeri**, *Berk. in Fl. N. Z.* ii. 191. *t.* 105. *f.* 12. About  $\frac{1}{12}$  in. high, white; stem slender, as long as the globose peridium, dilated below, slightly veined. Peridium evanescent above; outer membranous, subplicate; inner colourless. Nucleus adhering to the columella and peridium, branched, enclosing triangular lacunæ. Spores black in mass.

**Northern** Island: on fronds of *Hymenophyllum*, *Colenso*.

34. **DIDYMIUM**, Schrader.

Habit and characters of *Diderma*, but the two peridia are adnate and the outer furfuraceous or mealy.

A very common genus.

1. **D. australe**, *Berk. in Fl. N. Z.* ii. 191. Peridium subglobose, on a short nearly black, even stipes, which rises from a thin pale mycelium. Flocci crisped. Spores globose, black in mass.

**Northern** Island: on naked soil, *Colenso*.

2. **D. cinereum**, *Fries*;—*Fl. N. Z.* ii. 192. Solitary or confluent, adnate or shortly stipitate. Peridium subglobose, dirty white, scurfy; flocci reticulated, white, flat, irregularly reticulate. Spores mixed with minute, white, angular bodies, black.

**Northern** Island: on the naked soil, *Colenso*. (Europe, America, etc.)

35. **STEMONITIS**, Gleditsch.

Characters of *Diderma*, but peridium globose or cylindric, very delicate,



simple, evanescent, with the stipes passing through it. Nucleus (capillitium) reticulate, springing from the stem.

A considerable tropical and temperate genus.

1. **S. ferruginea**, *Ehrb.*;—*Berk. in Fl. N. Z.* ii. 192. Fascicled. Hypothallus persistent. Peridia fugacious; capillitium cylindric. Sporidia rusty-purple, large.

**Northern Island**: on dead wood, *Colenso*. (Europe.)

2. **S. typhoides**, *DC.*;—*Fl. N. Z.* ii. 192. Gregarious, minute. Hypothallus evanescent. Stipes black. Peridium cylindric. Spores brown, small.

**Northern Island**: Hawke's Bay, on a decayed *Polyporus*, *Colenso*. (Europe, etc.)

### 36. CYATHUS, Persoon.

Small Fungi, like diminutive birds'-nests. Peridium of three closely connected membranes, at length bursting at the apex, and the orifice closed by a white membrane. Sporangia plane, umbilicate, attached to the peridium by elastic cords.

A curious genus, from the resemblance of the species to birds'-nests with eggs; found in all parts of the world.

1. **C. novæ-Zelandiæ**, *Berk. in Fl. N. Z.* ii. 192. Narrow, elongate, obconical, about  $\frac{1}{2}$  in. high. Peridium tomentose externally, grooved and striate internally; margin indistinct, tomentose, not produced into a corona. Sporangia thick, black, glabrous, smooth.

**Middle Island**: Banks's Peninsula, on dead wood, *Raoul*.

2. **C. Colensoi**, *Berk. in Fl. N. Z.* ii. 192. Densely crowded, cup-shaped,  $\frac{1}{4}$  in. high, thin, flexible, dirty umber-coloured, pubescent externally, within even, brownish. Sporangia irregular, brown, thick-walled. Spores very minute, ovoid.

**Northern Island**: on the ground, *Colenso*.

### 37. CRUCIBULUM, Tulasne.

Habit of *Cyathus*. Peridium at first globose, at length eumped and obconic, of a uniform, spongy, fibrous, felted consistence. Orifice closed by a flat furfuraceous cover of the same colour. Sporangia plane, attached by a long cord to a nipple-like tubercle.

A genus of two species, one widely distributed.

1. **C. vulgare**, *Tulasne*;—*Berk. in Fl. N. Z.* ii. 193. Peridium dirty yellow, finally white. Spores minute, ovate.—*Berk. Outlines*. 312. t. 2. f. 1.

**Northern and Middle Islands**: common on twigs, etc. (Universally distributed.)

2. **C. emodense**, *Berk. in Hook. Kew Journ. Bot.* vi. 204?—*Fl. N. Z.* ii. 193 (*Crucibulum*). White, bell-shaped, narrowed below, sessile, broadly open above, not striate, externally fasciculately tomentose; margin stellate, ciliate. Sporangia short, umber.

**Middle Island**: Nelson, on wood, *Munro*.—A very fine species, doubtfully identified with the Himalayan one by Mr. Berkeley.

38. **LEPTOSTROMA**, Fries.

Minute, obscure Fungi, consisting of depressed, irregular or orbicular masses, covered with a thin perithecium that falls off by a transverse rupture, leaving a thin lower half. Spores simple, minute, borne on sporophores.

Little-known Fungi, of which some species are supposed to be forms of other polymorphous genera.

1. **L. litigiosum**, *Desmazières*;—*Fl. N. Z.* ii. 193. Perithecia subrotund, very minute, punctiform, scattered or conglomerate, brown-black, at length entirely splitting off.

**Northern** Island: on dead Fern stems. A doubtful identification. Mr. Berkeley adds that there are two forms, one smooth, the other strongly granulate. (Europe.)

39. **PHOMA**, Fries.

Minute Fungi, forming pustules on wood, leaves, stems, etc. Perithecium punctiform or subglobose, often spurious, discharging the minute simple spores by a small orifice at the apex.

A genus of numerous species.

1. **P. fallax**, *Berk. in Fl. N. Z.* ii. 193. Perithecia forming scattered or crowded, minute, discoid spots, when dry black, when moist brown, thin and transparent above. Spores oblong, subcymbiform; hyaline  $\frac{1}{1750}$  in. long.

**Northern** Island: on berries of *Rhipogonum*, *J. D. H.*

2. **P. acmella**, *Berk. in Fl. N. Z.* ii. 193. t. 106. f. 10. Perithecia forming brown specks on both sides of the leaf, depressed, brown, darkest in the centre. Spores about  $\frac{1}{3250}$  in. long, oblong, attenuated, but obtuse at each end.

**Northern** Island: on leaves of *Corynocarpus*, *J. D. H.*, with *Sphaeria acetabulum*, of which it is perhaps a form.

40. **HENDERSONIA**, Berk.

Microscopic Fungi. Perithecia subglobose, with often a terminal pore. Spores 2-multiseptate.

A considerable British and exotic genus.

1. **H. hyalospora**, *Berk. in Fl. N. Z.* ii. 194. t. 106. f. 8. Perithecia forming minute, black, shining dots upon bark, sometimes slightly papillate, generally without a pore. Spores  $\frac{1}{1250}$  in. long, hyaline, linear, obtuse at each end, 3-septate.

**Northern** Island: on bark of *Olea*, *Colenso*.

2. **H. microsticta**, *Berk. in Fl. Antarct.* 170. t. 68. f. 1. Perithecia minute, black, globose, covered with the epidermis. Spores pellucid, irregular, generally lanceolate, acute at both ends, 3-septate.

**Lord Auckland's** group and **Campbell's** Island: on scapes of *Anthericum*, *J. D. H.*

41. **ASCHERSONIA**, Mont.

Small, yellow or pallid, fleshy, superficial Fungi, growing on living vegetable substances. Cells tubular, interlaeved, arranged concentrically. Spores upon filiform sporophores, simple or septate, escaping by broad open pores.

A small tropical and subtropical genus.

1. **A. duplex**, Berk. in *Fl. N. Z.* ii. 194. Minute,  $\frac{1}{20}$ — $\frac{1}{12}$  in. broad, yellow, convex, lobed like a raspberry, rarely simple, convex, and containing only one cell; cells variable in size, one or more in each lobe. Spores oblong, hyaline,  $\frac{1}{3500}$  in. long.

**Northern** Island: on leaves of *Astelia*, Colenso.

42. **PHLYCTÆNA**, Desmazières.

Minute, epiphytic Fungi. Perithecium spurious, formed of the blackened cuticle of the plant, convex, opening by a pore, containing a gelatinous nucleus. Spores curved, elongate, spindle-shaped, upon very short sporophores.

A temperate and tropical genus.

1. **P. dissepta**, Berk. in *Fl. N. Z.* ii. 194. t. 106. f. 14. Spots scattered, variable in form, in patches  $\frac{1}{12}$ —1 in. long, surrounded by a black, flexuous, irregular line, black or colourless. Spores very slender, elongate, strongly curved at the apex,  $\frac{1}{600}$  in. long, on slender sporophores.

**Northern** Island: on dead stems of *Rhipogonum*, Colenso. Possibly a form of *Pemphidium opacum*.

43. **PILIDIUM**, Kunze.

Minute epiphyllous Fungi. Perithecium flat, shield-like, smooth, shining, tough, variously ruptured. Spores simple, linear, eurved, without sporophores, that is with the sporophores sunk in the perithecium.

A small temperate and tropical genus.

1. **P. coriariæ**, Berk. in *Fl. N. Z.* ii. 195. Perithecia black, rather rigid, seldom collapsed, at length perforate in the centre. Spores linear, slightly curved, obscurely narrowed at either end,  $\frac{1}{1500}$  in. long.

**Northern** Island: on dead leaves of *Coriaria sarmentosa*, Colenso.

44. **ASTEROMA**, DC.

Minute epiphyllous Fungi. Perithecia attached to crisped branching threads, flat, with no determinate orifice. Spores simple or 1-septate.

A considerable genus of temperate Fungi.

1. **A. dilatatum**, Berk. in *Fl. Antart.* 173. t. 68. f. 7. Forming superficial, suborbicular, olive-black patches,  $\frac{1}{8}$  in. broad, with lobed edges; lobes dilated, consisting of serpentine filaments, so crowded together as to form a membrane. Spores unknown.

**Northern** Island, *Colenso*, and **Lord Auckland's** group, *J. D. H.*, in both places on leaves of *Panax simplex*. This is perhaps only a rudimentary state of a *Collema*.

#### 45. GYMNOSPORIUM, Corda.

Pulverulent Fungi, forming strata or vegetable substances. Spores superficial, conglobate, simple, arising directly from the matrix, smooth.

Usually found on grass-stems.

1. **G. culmigenum**, *Berk. in Fl. N. Z.* ii. 197. Spots  $\frac{1}{12}$  in. and upwards long, half as broad, deep black. Spores elliptic or subglobose, with a thin epispore.

**Northern** Island: on dead grass, *Colenso*.

#### 46. PUCCINIA, Persoon.

Minute mildews. Spores crowded in patches, breaking through the epidermis of the plant they infest, and growing from a mycelium, 1-septate.

The mildews are the most common and destructive of Fungi, and are found in all parts of the world.

1. **P. compacta**, *Berk. in Fl. N. Z.* ii. 195. Patches orbicular, pale, of various sizes. Sori solitary and crowded, depressed; mass of spores compact, spongy. Spores elongate, subapiculate,  $\frac{1}{300}$ – $\frac{1}{400}$  in. long, often oblique; nucleus distinct.

**Southern** Island: on leaves of *Myosotis capitata*, *Lyall*.

2. **P. graminis**, *Persoon*;—*Berk. in Fl. N. Z.* ii. 195. Spots pale, diffuse; sori linear, confluent. Sporidia at length black.

Probably abundant on corn and all grasses: on *Triticum*, *Colenso*.

#### 47. UREDO, Léveillé.

Minute epiphyllous Fungi. Receptacle formed of several superpose irregular cells, each containing a single simple sessile or very shortly stalked spore.

A large genus of Fungi, inhabiting all parts of the world, and very destructive of vegetable tissues.

1. **U. antarctica**, *Berk. in Fl. Antarct.* 170. t. 68. f. 2. Spots small, opposite on both sides the leaf, rounded, purplish, pale beneath. Sori bullate. Spores large, smooth, broadly obovate, brown, with a central oily globule, very shortly stalked.

**Campbell's** Island: on leaves of *Luzula crinita*, *J. D. H.*

#### 48. UROMYCES, Léveillé.

Habit and characters of *Uredo*, but receptacle formed of a single layer of cells; spores stalked.

1. **U. scariosa**, *Berk. in Fl. N. Z.* ii. 195. Spots scattered, distinct,



on the under surface of the leaf; stroma prominent. Sori surrounded with the persistent cuticle. Spores obovate, echinulate.

**Northern** Island: on *Geranium* leaves, *Colenso*.

2. **U. citriformis**, *Bab. in Fl. N. Z.* ii. 195. Spots obliterated. Sori scattered, surrounded with the persistent cuticle. Spores large, linear-shaped, brown, shortly stalked.

**Northern** Island: on *Microtis*? or *Thelymitra*? leaves, *Colenso*.

#### 49. USTILAGO, Link.

Very minute Fungi, deep-seated in the tissues of the plants they infest, and occupying the whole of the part. Spores simple, arising from delicate threads or produced in the form of closely-packed cells that break up into a powdery mass.

This genus forms dusty masses on the seed, stems, and other parts of plants, and is found in all parts of the world. The *U. segetum* is the smut of wheat, oats, and barley.

1. **U. Candollei**, var. *a. Tulasne*;—*Berk. in Fl. N. Z.* ii. 196. Forming elongated masses on *Polygonum* peduncles. Spores elliptic-ovate, smooth, violet-coloured.

**Northern** Island: on the inflorescence of *Polygonum prostratum*, *Colenso*.

2. **U. endotricha**, *Berk. in Fl. N. Z.* ii. 196. t. 106. f. 4. Forming oblong black bodies on *Gahnia* peduncles. Spores subglobose, mixed with crisp fibres, minutely granulate.

**Northern** Island: on the inflorescence of *Gahnia*, *Sinclair*.

3. **U. bullata**, *Berk. in Fl. N. Z.* ii. 197. t. 106. f. 12. Forming bullate black long spots on the inflorescence of grasses. Spores irregularly subglobose, mixed with threads, obscurely rough, nucleus pale.

**Northern** and **Middle** Islands: on *Triticum scabrum*, *Raoul*, *Colenso*.

#### 50. ÆCIDIDIUM, Persoon.

Forming dark spots or pustules on leaves and other parts of living plants. Peridium membranous, with a lacerated or toothed reflected orifice. Spores concatenate, collected into sori.

A vast genus, found in all parts of the globe, often very destructive to vegetable tissues.

1. **Æ. Ranunculacearum**, *DC.*;—*Berk. in Fl. N. Z.* ii. 196. Spots obliterated. Peridia densely crowded into irregular heaps, orange-yellow.

**Northern** Island: on leaves of *Ranunculus rivularis*, *Colenso*. (Europe, Tasmania, etc.)

2. **Æ. monocystis**, *Berk. in Fl. N. Z.* ii. 196. t. 105. f. 15. Peridia large, solitary, persistent on the upper surface of the leaves towards their tips, surrounded with a tough border. Spores pale orange-yellow.

**Northern** Island: on the tips of the leaves of *Helophyllum Colensoi*, *Colenso*.

51. **STILBUM**, Tode.

Minute Fungi, consisting of a globose deciduous head on an erect stalk. Stalk solid. Heads deciduous, gelatinous. Spores minute.

Chiefly a temperate genus, with a few tropical species.

1. **S. lateritium**, Berk.;—*Fl. N. Z.* ii. 197. Gregarious, erumpent, pale brick-red. Stems  $\frac{1}{12}$  in. high, thickest at the base, often confluent and flattened, pruinose from the presence of curved obtuse flocci. Capitula ovate or hemispherical, minutely setulose. Sporidia oblong.

**Middle Island**: on bark, *Lyall*, *Bidwill*. (S. America.)

52. **EPICOCCUM**, Link.

Minute Fungi, forming raised specks on leaves, etc. Spores large, subglobose, simple or compound, springing from the surface of a cushion-like receptacle.

All the known species are natives of temperate climates.

1. **E. pallescens**, Berk. in *Fl. N. Z.* ii. 198. t. 105. f. 14. Specks fawn-coloured, at first covered by epidermis. Receptacula of several layers, the lowest with fimbriated edges. Spores shortly stalked, cellular, enclosing many sporidia.

**Northern Island**: on dead leaves of *Earina*, *Colenso*.

53. **CEDEMIUM**, Link.

Small Fungi, forming black felted masses of floccose filaments. Filaments rigid, opaque, protruding large globose usually reticulated spores at their sides.

A small genus of temperate climates, probably allied to *Antennaria*.

1. **C. robustum**, Berk. in *Fl. N. Z.* ii. 198. Forming a stratum of rigid erect bristly filaments,  $\frac{1}{16}$  in. long, jointed below, above bearing a few divided curved branches.

**Northern Island**: on bark, *Colenso*.

54. **MACROSPORIUM**, Fries.

Plants forming a thin floccose stratum, covered with erect, clavate, multi-septate spores.

A little-studied genus of microscopic Fungi, often parasitic on other Fungi.

1. **M. obtusum**, Berk. in *Fl. N. Z.* ii. 198. Forming an olivaceous coat on the mouths of a *Hypoxyylon*. Filaments obsolete. Spores  $\frac{1}{80}$  in. long, clavate, obtuse, 4-5-partite, each division with a globose nucleus.

**Northern Island**: on the mouths of a *Hypoxyylon*, *Colenso*.

55. **CLADOSPORIUM**,

Fungi consisting of a minute filamentous mycelium, the filaments divided into short branches, which bear short 1-septate deciduous spores.

The only well-known species of this genus is the commonest of parasitic Fungi, infesting all sorts of decaying substances, and sometimes smothering living trees.

1. **C. herbarum**, *Link* ;—*Fl. Antarct.* 170. Mycelium dense, soft, green, then olive-black; filaments pellucid, collapsing. Spores olive.

**Lord Auckland's** group and **Campbell's** Island: on *Carex* leaves, *J. D. H.* (Ubiquitous.)

#### 56. SEPEDONIUM, *Link.*

Minute Fungi, consisting of a copious filamentous mycelium, bearing at the tips of its divisions myriads of large globose spores.

Abundant Fungi, preying on the large fleshy species, through whose soft tissues their mycelium spreads. Some species certainly rudimentary parasitic *Sphæriæ*.

1. **S. chrysospermum**, *Fries* ;—*Berk. in Fl. N. Z.* ii. 199. Filaments white. Spores golden-yellow, globose, echinulate when dry.

**Northern** Island: on *Boleti*, Bay of Islands, *J. D. H.* (Probably ubiquitous.)

#### 57. PILACRE, *Fries.*

Very minute Fungi, consisting of globose stipitate heads. Stem solid, cylindric, simple or branched. Head globose, of branched radiating flexuous threads. Spores at the tips of the branches, forming a dusty mass.

A small genus of temperate Fungi.

1. **P. divisa**, *Berk. in Fl. N. Z.* ii. 197. Stems  $\frac{1}{12}$ – $\frac{1}{8}$  in. high, brown, subfascicled, compressed below, forked above, when young pale and tomentose below. Heads globose, clay-coloured. Spores subglobose or elliptic,  $\frac{1}{5000}$  in. long, nucleus distinct.

**Northern** Island: on bark, *Colenso*.

#### 58. LEOTIA, *Hill.*

Stalked fleshy pileate Fungi. Receptacle capitate, covered everywhere with the asci; margin revolute.

Natives of temperate regions, growing on moss and on the ground amongst grass, etc.

1. **L. lubrica**, *Persoon*. Subgelatinous, 1–2 in. high. Pileus tumid, repand, olive-green. Stem at length hollow.

Var.  $\beta$ , *Berk.* Stipes green, thickened downwards.

Var.  $\beta$ . **Middle** Island: Canterbury, *Haast*, on the ground. Identified by Mr. Berkeley from a drawing. (The original plant is European.)

#### 59. GEOGLOSSUM, *Persoon.*

Fleshy erect Fungi. Receptacle stalked, clavate, covered with the hymenium. Asci elongate.

A large genus in temperate climates, growing in shade, on the ground, moss, etc.

1. **G. hirsutum**, *Persoon* ;—*Berk. in Fl. N. Z.* ii. 199. Erect, hairy, black, 1–2 in. high.

**Northern** Island, *Colenso*. (Europe.)

60. **PEZIZA**, Dillenius.

Cup-shaped Fungi. Receptacle fleshy or subfleshy, at first closed, then open. Hymenium persistent. Asci distinct, fixed, mixed with paraphyses, ejecting the spores elastically.

A vast genus, found in all parts of the world, on the ground, rotten wood, etc. etc. Many species resemble the apothecia of *Lichens*.

§ 1. **ALEURIA**.—*Fleshy, or between fleshy and membranous, externally pruinose or furfuraceous and floccose.*

1. **P. miltina**, Berk. in *Fl. N. Z.* ii. 199. Cup  $\frac{1}{3}$  in. across, depressed, expanded, crimson, irregular, fixed to the soil by its whole surface; margin free, paler beneath. Asci linear. Sporidia globose, nucleus single.

**Northern** Island: Hawke's Bay, amongst moss, *Colenso*.

2. **P. endocarpoides**, Berk. in *Fl. N. Z.* ii. 199. t. 105. f. 8. Cup  $\frac{1}{3}$  in. diameter, fixed by a floccose mass; margin free, concave, at length expanded and convex, obscurely floccose externally. Asci cylindrical. Sporidia 8, globose, each with a large nucleus.

**Northern** Island: on the ground, *Colenso*.

3. **P. rhytidia**, Berk. in *Fl. N. Z.* ii. 200. t. 105. f. 6. Cup 1 in. and more diameter, fuliginous, hemispherical, nearly sessile, deeply incised; margin narrow, inflected; outer coat wrinkled, of netted fibres, inner more compact, giving rise to the long asci and slender paraphyses. Sporidia elliptic-oblong, subcymbiform.

**Northern** Island: on the ground, *J. D. H.*, *Colenso*.

4. **P. campylospora**, Berk. in *Fl. N. Z.* ii. 200. Cup 1 in. diameter, oblique, lobed, wrinkled externally, clothed with myceloid filaments; stem short, wrinkled. Hymenium fuliginous, vinous-red, white internally and composed of intricate threads. Asci linear. Sporidia strongly curved.

**Northern** Island: on dead wood, *Colenso*.

§ **LACHNEA**.—*Waxy, externally pilose or villous.*

5. **P. stercorea**, Fries;—Berk. in *Fl. N. Z.* ii. 200. Gregarious. Cup sessile, concave,  $\frac{1}{8}$ –14 in. diameter, yellow; margin ciliated with straight bristles.—*Fl. Antarct.* 451. t. 163. f. 4.

**Northern** Island: on horsedung, *Colenso*. (Europe, America, Tasmania, etc.)

6. **P. Kerguelensis**, Berk.;—*Fl. N. Z.* ii. 201. Cup  $\frac{1}{2}$ – $\frac{3}{4}$  in. broad, scarlet, flat, adnate; margin free, ciliated with spreading bristles. Asci linear, obtuse. Sporidia broadly elliptic; nucleus solitary, globose.—*Fl. Antarct.* 451. t. 164. f. 3.

**Northern** Island: on the ground, *J. D. H.* (Kerguelen's Land.)

7. **P. calycina**, Fries;—Berk. in *Fl. N. Z.* ii. 200. Cups  $\frac{1}{12}$ – $\frac{1}{4}$  in. diameter, stipitate, gregarious, erumpent, funnel-shaped, externally white and villous; disk flat, pale orange-colour.

**Northern** Island: on dead twigs, *Sinclair*. (Europe.)



8. **P. Colensoi**, *Berk. in Fl. N. Z.* ii. 200. *t.* 105. *f.* 5. Cup  $\frac{1}{8}$  in. diameter, pale tan-colour, funnel-shaped, with a short thick stipes, fixed by an orbicular disk, base plicate, minutely downy above and on the margin, not ciliate. Hymenium even. Asci nearly equal. Sporidia oblong, elliptic, or subfusiform; nucleus contracted into 2–4 masses, but not septate.

**Northern Island:** on dead sticks, *Colenso*.

9. **P. chrysotricha**, *Berk. in Fl. N. Z.* ii. 201. *t.* 105. *f.* 7. Cups  $\frac{1}{12}$  in. diameter, golden-yellow, sessile, at first globose then subhemispherical, edge sometimes membranous, clothed with short matted hairs, somewhat pulverulent. Hymenium closed when dry, seated on a stratum of large unequal cells. Asci cylindric, rather large. Sporidia cymbiform, narrowed at either end.

**Northern Island:** on dead twigs, *Colenso*.

§ 3. PHIALEA.—*Waxy or membranous, quite glabrous. Cup at first closed.*

10. **P. montiæcola**, *Berk. in Fl. N. Z.* ii. 201. Cups minute, black, soon expanding; margin narrow, sometimes flexuous. Asci large, clavate, shorter than the long paraphyses. Sporidia subcymbiform; nucleus 2-partite.

**Northern Island:** on decaying *Montia*, *Colenso*.

## 61. PATELLARIA, Fries.

Flat, discoid, small, tough Fungi. Receptacle saucer- or cup-shaped, open, never closed. Hymenium rather powdery. Asci connate, without paraphyses.

A small genus, closely allied to *Peziza*. The species are chiefly temperate.

1. **P. nigro-cinnabarina**, *Schweinitz*;—*Berk. in Fl. N. Z.* ii. 201. Hymenium vermilion-coloured.

**Northern Island:** on dead branches, *Colenso*. (N. America.)

2. **P. atrata**, *Fries*;—*Berk. in Fl. N. Z.* ii. 201. Cups flattened, black.

**Northern Island:** on dead bark, *Colenso*. (Europe.)

## 62. CENANGIUM, Fries.

Form of *Peziza*, but firm, tough and coriaceous. Receptacle or cup closed, opening late. Hymenium smooth, persistent.

A small European genus.

1. **C. Colensoi**, *Berk. in Fl. N. Z.* ii. 201. Scattered, oblong, at first covered with the cuticle, then expanding, and orbicular, brown. Hymenium pale, pinkish. Asci oblong. Sporidia elliptic, hyaline,  $\frac{1}{4000}$  in. long.

**Northern Island:** on dead leaves, *Colenso*.

## 63. HYSTERIUM, Tode.

Minute, tumid, elliptic or elongate Fungi. Perithecia bursting by a simple longitudinal fissure, hence 2-lipped; borders entire. Asci elongate.

A large genus in temperate regions, growing on leaves, bark, etc.

1. **H. breve**, *Berk. in Fl. Antarct.* i. 174. t. 68. f. 8. Perithecia short, black, elliptic, prominent, orifice very narrow. Asci linear, mixed with paraphyses. Sporidia filiform.

**Campbell's Island**: on dead leaves of *Uncinia*, *J. D. H.*

#### 64. **AILOGRAPHUM**, Libert.

Habit of *Hysterium*, but perithecia often branched and asci subglobose.

A small temperate genus, usually epiphyllous.

1. **A. Bromi**, *Berk. in Fl. Antarct.* i. 174. t. 68. f. 9. Perithecia simple, black, shining, mixed with filaments. Asci very short, obovate. Sporidia 8, elliptic-oblong, constricted in the middle, 1-septate.

**Lord Auckland's group**: on leaves of *Danthonia*, *J. D. H.*

#### 65. **ASTERINA**, Lévillé.

Minute, flattened, epiphyllous Fungi. Perithecia fragile, formed of a fimbriated mycelium. Asci perfect. Sporidia 4-8.

A small tropical, N. America, and N. Zealand genus; only one species is known in Europe.

1. **A. torulosa**, *Berk. in Fl. N. Z.* ii. 208. Mycelium very sparse. Perithecia in scattered groups. Asci elongate. Sporidia filiform, 3-5-septate, contracted at the septa, greenish.

**Northern Island**: on leaves of *Piper*, *Colenso*.

2. **A. sublibera**, *Berk. in Fl. N. Z.* ii. 208. t. 106. f. 1. Mycelium sparse, in little patches. Asci elongate. Sporidia 4, oblong, 1-septate, hyaline.

**Northern Island**: on leaves of *Metrosideros diffusa*, *Colenso*.

3. **A. fragilissima**, *Berk. in Fl. N. Z.* ii. 208. Mycelium forming spots scarcely  $\frac{1}{12}$  in. broad, sparse. Perithecia crowded, very brittle. Asci globose. Sporidia obovate-oblong, 1-septate.

**Northern Island**: on *Veronica* leaves, *Colenso*.

#### 66. **EXCIPULA**, Fries.

Minute epiphyllous Fungi, forming spots or patches. Perithecium carbonaceous, spherical, free, at first closed, then opening; mouth orbicular, entire; nucleus naked, gelatinous, turgid. Asci perfect.

Mr. Berkeley limits this genus as defined by Fries, in the 'Summa Vegetabilium Scandinaviae.' The species are natives of temperate regions.

1. **E. nigro-rufa**, *Berk. in Fl. N. Z.* ii. 202. t. 106. f. 11. Subglobose, black without, red within; mouth inflexed. Asci broad, clavate,

obtuse. Sporidia hyaline, obovate, oblong, obtuse, with about 4 transverse septa.

**Northern** Island: on the under surface of the leaves of *Pittosporum crassifolium*, *Colenso*.

2. **E. gregaria**, *Berk. in Fl. N. Z.* ii. 202. Minute, crowded on a brownish spot. Cups black without, pale within. Asci broad, clavate. Sporidia obovate-oblong, obscurely 2-partite internally.

**Northern** Island: upper surface of *Gnaphalium* leaves, *Colenso*.

## 67. CORDICEPS, Fries.

Erect, columnar, rather rigid, fleshy or corky Fungi, growing often on animal matter, as dead caterpillars. Perithecia crowded round the axis or its branches, which form the fruit-bearing head or heads, hyaline or coloured. Sporidia submoniliform, repeatedly divided.

A very curious genus, found in both tropical and temperate climates. The ergots of Rye and other grasses are an imperfect state of species of *Cordiceps*.

1. **C. Robertsii**, *Berk. in Fl. N. Z.* ii. 202. Slender, 2-6 in. high. Stem rigid, cylindric. Receptacle very little broader than the stipes, 1-2 in. long, cylindric, often flexuous.—*Sphæria Robertsii*, Hook. Ic. Pl. t. 11. *S. Hugelii*, Corda.

**Northern** and **Middle** Islands: on the caterpillar of *Hepialus virescens*, *Roberts*, etc. Caterpillar Fungus.)

2. **C. Sinclairii**, *Berk. in Fl. N. Z.* ii. 338. Yellowish,  $\frac{3}{4}$ -1 in. high. Stem cylindric, simple or forked, divided into many simple or lobed heads, clothed with oblong conidia.

**Northern** Island: on the larva of an orthopterous insect, *Archdeacon Williams*.—The perithecia are absent, and hence the species is not well established. Mr. Travers sends a similar plant growing from a coleopterous larva, likewise destitute of perithecia.

## 68. HYPOCREA, Fries.

Fleshy or gelatinous horizontal Fungi, growing on wood, etc. Perithecia tender, hyaline or coloured. Sporidia indefinite.

A tropical and temperate genus.

1. **H. gelatinosa**, *Fries*;—*Berk. in Fl. N. Z.* ii. 202. Convex, equal, opaque, variable in colour without, dirty white within. Perithecia prominent, darker than the stroma.

**Northern** Island: on wood, *Colenso*. (Europe.)

## 69. XYLARIA, Fries.

Club-shaped, somewhat corky, often friable Fungi, usually distinctly stipitate, covered with a rufous or black bark. Perithecia crowded on the surface of the receptacle. Sporidia 8.

A very large, especially tropical genus, growing on vegetable substances, or dung.

1. **X. Hypoxylon**, *Fries*;—*Berk. in Fl. N. Z.* ii. 203. Corky, 2–4 in. high, simple or branched, compressed, at first pulverulent with white meal, then naked. Stem villous.

**Northern** Island: on dead wood, *Colenso*. (Europe, Tasmania.)

2. **X. multiplex**, *Kunze*;—*Berk. in Fl. N. Z.* ii. 203. Corky, tufted, brown-black, divided above into even somewhat cylindrical compressed branches; stem elongate, rough with leprous down.

**Northern** Island: on dead wood, *Colenso*. (Juan Fernandez.)

3. **X. anisopleuron**, *Mont.*;—*Berk. in Fl. N. Z.* ii. 205. Solitary, woody. Receptacle oblique, obconic, leprous, opaque, pale within. Perithecia in the upper subhemispheric part, globose, papillate in the centre.

**Northern** Island: on dead wood, *Colenso*, specimen young. (Guyana.)

4. **X. castorea**, *Berk. in Fl. N. Z.* ii. 204. *t.* 105. *f.* 10. Stem  $\frac{1}{4}$  in. high, longitudinally wrinkled, downy, then glabrous. Receptacle ovate, compressed, obtuse, 1 in. long,  $\frac{1}{2}$ – $\frac{2}{3}$  broad, dotted with the mouths of the perithecia. Asci slender. Sporidia subelliptic.

**Northern** Island: on dead wood, *Colenso*.

5. **X. tuberiformis**, *Berk. in Fl. N. Z.* ii. 204. *t.* 105. *f.* 11. Subglobose, sessile or shortly stipitate. Receptacle  $\frac{1}{4}$ – $\frac{1}{3}$  in. diameter, minutely cracked, white and corky within. Perithecia elliptic; mouth large. Sporidia large, cymbiform.

**Northern** Island: on dead wood, *Colenso*.

## 70. HYPOXYLON, Bulliard.

Characters of *Xylaria*, but horizontal. Stroma not confluent with the substance of the plant on which it grows.

A tropical and temperate genus.

1. **H. concentricum**, *Fries*;—*Berk. in Fl. N. Z.* ii. 204. Large, brownish subglobose, at length black, concentrically zoned within.

**Northern** and **Middle** Islands: common on dead wood, from the Bay of Islands, *J. D. H.*, to Otago, *Lindsay*. (Cosmopolite.)

2. **H. annulatum**, *Montagne*;—*Berk. in Fl. N. Z.* ii. 204. Mycelium thick, abundant, of branched threads, the ultimate branchlets zigzag, with often 2-fid tips. Stroma convex or effuse and confluent, blackish outside and in. Perithecia globose with a depressed ring round the mouth, at last nearly free.

**Northern** Island: on dead bark, *Colenso*. (N. and S. America.)

## 71. DIATRYPE, Fries.

Characters of *Hypoxylon*, but the stroma is confluent with the wood of the plant on which the Fungus grows. Perithecia with a more or less obvious neck.



Both tropical and temperate Fungi.

1. **D. glomeraria**, *Berk. in Fl. N. Z. ii. 205. t. 106. f. 13.* Pustules thickly scattered, small, breaking through the cuticle, black, opaque,  $\frac{1}{24}$  in. long. Perithecia crowded, subglobose; neck short; mouth obscure. Asci with 8 linear curved sporidia.

**Northern Island**: on branches of *Rhipogonum*, *Colenso*.

2. **D. lata**, *Fries*;—*Berk. in Fl. N. Z. ii. 205.* Effuse, unequal. Stroma thin, black. Perithecia sunk in the wood; mouth conical.

**Northern Island**: on sticks, *Colenso*. (Europe, Tasmania.)

## 72. DOTHIDEA, Fries.

Characters of *Sphaeria*, but perithecium 0. Stroma with numerous cells, opening by a simple pore.

A very large tropical and temperate genus of small Fungi, found on leaves, twigs, etc.

1. **D. Ribesia**, *Fries*;—*Berk. in Fl. N. Z. ii. 207.* Subelliptic, breaking through the cuticle, depressed, black inside and out; cells small, white, almost superficial.

**Northern Island**: on gooseberry twigs, *Colenso*. (Europe.)

2. **D. filicina**, *Mont.*;—*Berk. in Fl. N. Z. ii. 207.* Hypophyllous; stroma thin, areolate, black; cells shallow; ostiola minute. Sporidia uniseptate.

**Northern Island**: on under surface of fern fronds. (Otaheite.)

3. **D. Colensoi**, *Berk. in Fl. N. Z. ii. 207.* Orbicular,  $\frac{1}{2}$  in. broad, black, granulate, fertile on either side; cells minute, white within.

**Northern Island**: on dead leaves, *Colenso*.

4. **D. hemisphaerica**, *Berk. in Fl. Antart. 172. t. 67. f. 2.* Solitary, black, carbonaceous, breaking through the under surface of the leaf; floccose at the base; cells elliptic, obtuse. Asci short. Sporidia 8, oblong, 1-septate, contracted in the middle.

**Lord Auckland's group**: on leaves of *Veronica odora*, *J. D. H.*

5. **D. spilomea**, *Berk. in Fl. Antart. 173. t. 67. f. 2.* Gregarious on the under surface of the leaf, thin, depressed, orbicular, often confluent, minutely granular, shining; cells globose, orifice punctiform. Asci clavate. Sporidia oblong, 1-septate, constricted in the middle.

**Lord Auckland's group** and **Campbell's Island**: on leaves of *Veronica elliptica*, *J. D. H.*

## 73. NECTRIA, Fries.

Small Fungi, growing on wood, bark, etc. Perithecia free or seated on a mycelium, thin, rarely thick, vertical, brightly coloured. Sporidia 8, translucent.

A large temperate genus with few tropical species, often brightly coloured.

1. **N. polythalama**, Berk. in *Fl. N. Z.* ii. 203. *t.* 106. *f.* 15. Tufted, bright scarlet. Perithecia ovate, umbilicate at the apex or depressed. Sporidia many-septate, oblong.

**Northern** Island: on dead bark, *J. D. H.*

2. **N. illudens**, Berk. in *Fl. N. Z.* ii. 203. Scattered or crowded, but not tufted, globose, bright ochreous or cinnabar-red, dimpled at the apex, warted, the warts answering to large cells. Sporidia broad, elliptic, 1-septate, as broad as long.

**Northern** Island: on dead bark, *J. D. H.*

#### 74. SPHÆRIA, Haller.

Stroma 0, or spurious and formed of mycelium. Perithecia various, vertical, firm, black or dark, often with a bark. Asci perfect. Sporidia 8.

An immense genus, found in all parts of the world and on various substances, some even under salt-water.

§ 1. CÆSPITOSÆ.—*Perithecia cæspitose, superficial, free, seated on a mycelioid stroma that bursts through the cuticle.*

1. **S. fragilis**, Berk. in *Fl. N. Z.* ii. 205. *t.* 106. *f.* 7. Forming scattered clusters of minute, brownish, opaque, obtuse, brittle perithecia, breaking away when still full of spores; mouth obsolete. Sporidia shortly fusiform, hyaline, often broader at one end, 1-septate.

**Northern** Island: on the under surface of leaves of *Eurybia furfuracea*, *Colenso*.

2. **S. pullularis**, Berk. in *Fl. N. Z.* ii. 205. *t.* 106. *f.* 6. Forming specks of a few crowded subglobose opaque dark brown perithecia; mouth 0, or a papilliform prominence. Asci subcylindric. Sporidia of 2 opposed cones.

**Northern** Island: on leaves of *Leucopogon Fraseri*, *Colenso*.

3. **S. rasa**, Berk. in *Fl. N. Z.* ii. 205. Forming neat round clusters. Perithecia oblong, crowded below, above free, convex, not collapsing, opaque as if minutely downy, but rough from the prominence of the septa of the cells; orifice minute. Asci cylindric, slightly attenuate downwards. Sporidia very numerous, curved.

**Northern** Island: on *Weinmannia* leaves, *Colenso*.

4. **S. Saubinetii**, Mont. and Durieu;—Berk. in *Fl. N. Z.* ii. 206. Erumpent. Perithecia solitary or slightly aggregate, brown, globose, at length collapsed and umbilicate. Asci diffluent. Sporidia fusiform, lunulate, 3–5-septate.—*Gibbera Saubinetii*, Mont. Syllog. 252.

**Northern** Island: on Monocotyledonous leaves, *Colenso*. (Algeria.)

5. **S. pulicaris**, Fries;—Berk. in *Fl. N. Z.* ii. 206. Minute, tufted, forming a blackish stroma with the bark. Perithecia stipitate, superficial, crowded, opaque, flat, finally sub-cupshaped.

**Northern** Island: on dead sticks, *Colenso*. (Europe.)

§ 2. SERIATÆ.—*Perithecia disposed in parallel lines.*

6. **S. nebulosa** ?, Pers. ;—Berk. in *Fl. Antarct.* 171. Forming grey spots on a subcuticular black crust. Perithecia gregarious, very minute, free, disposed in irregular series ; mouth rather prominent, subacute.

**Lord Auckland's** group and **Campbell's** Island : on *Anthericum*, J. D. H. Specimen imperfect and identification doubtful.

§ 3. OBTECTÆ.—*Perithecia immersed, often erumpent ; mouth dilated, produced into a neck, which is immersed in the matrix.*

7. **S. livida**, Fries ;—Berk. in *Fl. N. Z.* ii. 206. Forming elongated subdeterminate white or grey spots on wood. Perithecia scattered, subglobose, thin, black, sunk in a prominent elliptic grey elevation of the wood ; mouth short, imbedded.

**Northern** Island : on dead bleached twigs, Colenso. (Europe.)

§ 4. CAULICOLÆ.—*Perithecia at first covered with the epidermis, through which they break.*

8. **S. herbarum**, Persoon ;—Berk. in *Fl. N. Z.* ii. 206. Subgregarious, minute, black. Perithecia partially covered, depressed, globose, smooth ; mouth rather prominent, punctiform.—*Fl. Antarct.* 170. t. 68. f. 3.

Throughout the **Northern** and **Middle** Islands, and in **Lord Auckland's** group and **Campbell's** Island : on stems of herbaceous plants, abundant. (Ubiquitous.)

9. **S. coffeata**, Berk. in *Fl. N. Z.* ii. 206. t. 106. f. 3. Perithecia scattered, subglobose, indicated by black specks on the cuticle. Asci cylindric. Sporidia filiform.

**Northern** Island : on sheaths of grasses, Colenso.

10. **S. Lindsayi**, Currey. Perithecia very small, round, rupturing the epidermis by a circular rimose or radiate fissure. Sporidia 8, 2-seriate, colourless, irregularly cymbiform, 0.0014 to 0.002 in. long.

**Middle** Island : dead leaves of *Phormium*, Otago, Lindsay.—Plant when dry somewhat resembling *S. nebulosa*, Fries.

11. **S. nigrella** ?, Fries ;—Berk. in *Fl. Antarct.* 171. Perithecia subglobose, smooth, black, superficially innate, on an elongate determinate spot, white within.

**Lord Auckland's** group and **Campbell's** Island : on stems of *Anthericum*, J. D. H.—Very imperfect, and doubtfully referred to the European plant.

§ 5. FOLICULÆ.—*Perithecia concrete with the matrix, covered, without any surrounding discoloured spot.*

12. **S. phæosticta**, Berk. in *Fl. Antarct.* 171. t. 68. f. 4. Gregarious, appearing in punctiform brown spots, under which is a perithecium. Perithecia globose, black, with a punctiform mouth. Asci at first short, then linear. Sporidia at first in two series, elliptic, afterwards brown, cymbiform, and in one series ; nucleus large, globose.

**Lord Auckland's** group and **Campbell's** Island : on leaves of *Hierochloë Brunonis*, J. D. H.

13. **S. depressa**, Berk. in *Fl. Antarct.* 172. t. 68. f. 5. Gregarious,

minute, black, appearing as black specks on the cuticle. Perithecia covered by the cuticle, subglobose, smooth, not produced into a neck, depressed when dry. Asci linear, mixed with slender paraphyses. Sporidia 2-seriate, lanceolate; nucleus 2-partite but not septate.

**Campbell's Island**: on leaves of *Luzula crinita*, *J. D. H.*

14. **S. Acetabulum**, *Berk. in Fl. N. Z.* ii. 206. *t.* 106. *f.* 2. Minute, black, covered by the cuticle. Perithecia slightly irregular, depressed, convex below, concave above, adnate with the cuticle in the centre, without a trace of orifice. Asci oblong, narrowed and truncate above. Sporidia oblong, immature.

**Northern Island**: on *Corynocarpus*, *Colenso*.

15. **S. cryptospila**, *Berk. mss.* Microscopic, punctiform, black, shining. Asci short. Sporidia elongate, linear, curved, 3-4-septate.

**Northern Island**: on leaves of *Hypericum*, *Sinclair*.

## 75. CAPNODIUM, Montagne.

Mycelium of black jointed moniliform filaments, mixed with other simple ones, enclosing elongate sometimes branched perithecia. Perithecia containing sometimes asci with sporidia, at others only spores.

A remarkable genus, perhaps a more perfect form of *Antennaria*.

1. **C. fibrosum**, *Berk. in Fl. N. Z.* ii. 209. Forming a rigid bristly stratum,  $\frac{1}{3}$  in. thick. Perithecia elongate, crowded, fasciculately branched.

**Northern Island**: on bark, *Colenso*.

## 76. PEMPHIDIUM, Montagne.

Perithecium spurious, convex, shield-like, black, formed of the diseased epidermis, closed or terminating in a papilla or 2-lipped pore; nucleus gelatinous. Asci perfect. Sporidia elongate.

A peculiar genus, of one species, the following, and a native of Guyana.

1. **P. opacum**, *Berk. in Fl. N. Z.* ii. 207. *t.* 106. *f.* 9. Patches  $\frac{1}{12}$ - $\frac{1}{6}$  in. broad, round, black, opaque, beneath which is an ovate transparent mass of asci. Asci cylindric or swollen in the middle. Spores fusiform, narrowed to a thread at either end, not septate, but the endochrome is divided irregularly into 2 or 3 masses.

**Northern Island**: on stems of *Rhipogonum*, *Colenso*.

## 77. ERYSHIPHE, Hedwig.

Perithecia free, globose, without an opening, giving off at the base flexuous, equal, simple or sparingly branched filaments. Asci saccate.

An immense genus of minute Fungi, natives of temperate regions, where they are the pest of agriculturists, etc.



1. **E. densa**, Berk. in *Fl. N. Z.* ii. 208. t. 106. f. 16. Mycelium dense, cobwebby, persistent. Perithecia scattered, with flexuose somewhat forked filamentose appendages.

**Northern** Island: on leaves of *Aristotelia*, Colenso.

#### 78. CHÆTOMIUM, Kunze.

Perithecium brittle, membranous, without an opening, clothed with opaque hairs. Asci gelatinous, evanescent. Sporidia brown.

Minute parasitic Fungi.

1. **C. amphitrichum**, Corda;—Berk. in *Fl. N. Z.* ii. 209. Perithecia half-immersed; threads smooth, slightly branched; apices curved. Sporidia subglobose.

**Northern** Island: on damp paper, Colenso. (Europe.)

2. **C. elatum**, Kunze;—Berk. in *Fl. N. Z.* ii. 209. Perithecia free; threads branched, minutely scabrous. Sporidia lemon-shaped.

**Northern** Island: on damp straw, Colenso. (Ubiquitous.)

#### 79. MELIOLA, Fries.

Perithecia carbonaceous, fragile, without a pore, developed from a strigose mycelium. Asci broad. Sporidia few, large.

Minute parasitic Fungi, natives of warm climates.

1. **M. amphitricha**, Fries;—Berk. in *Fl. N. Z.* ii. 209. Superficially innate, black, forming spots  $\frac{1}{4}$ – $\frac{1}{2}$  in. diameter. Perithecia crowded, surrounded with erect simple bristles.

**Northern** Island: on living leaves, Colenso. (Subtropics of Old and New World.)

#### 80. ANTENNARIA, Link.

Black Fungi, consisting of black jointed moniliform filaments, bearing here and there spore-cases full of granules.

Found in all climates, infesting living plants, often smothering them in a black mass of filaments.

1. **A. Robinsonii**, Mont.;—Berk. in *Fl. N. Z.* ii. 209. Forming a dense black coat on leaves, consisting of a close gelatinous web, traversed by moniliform threads, from which arise branched filaments, bearing lateral or subterminal spore-cases.—*Fl. Antart.* 175. t. 67.

**Northern** and **Middle** Islands: on leaves and twigs, Colenso, Lyall, etc. **Lord Auckland's** group and **Campbell's** Island, J. D. H.

The genus *Sclerotium*, which consists of imperfect states of various Fungi, is now suppressed. A Lord Auckland's group species was published in *Fl. Antart.* i. 175, as *S. durum*, Pers. It was found on the capsules of *Gentiana*, but of what Fungus it is a state is unknown.

## ORDER IX. ALGÆ.

Plants consisting either of simple cells or of threads of cells, or of cellular fronds, almost invariably aquatic and chiefly marine; usually fixed by a root (which does not nourish the plant); imbibing nutriment through their whole surface; supposed to be always 2-sexual, though this is not yet demonstrated in many genera; very many are propagated also by division of the plant, or by buds from it, or by the division of individual cells. Reproductive organs of various kinds, on one or on different plants, naked on the surface of the frond, or buried in its substance, or contained in proper cavities or sacs (conceptacles), which again may either be superficial or immersed, or contained in special branches of the frond. *Female fructification*, consisting of simple or compound spores, which originate as cells that are fertilized by antherozoids, or by the contact of other cells that transmit the fertilizing matter; these spores may be naked or clothed in a gelatinous envelope, or contained in tubes (*asci*). *Male fructification* essentially and usually of microscopic antherozoids, contained in sacs or cells, and consisting of a nucleus with vibrating threads of infinite delicacy. In the unicellular species and those formed of threads of cells, the sexes may be represented by a single cell that divides in the middle, or by 2 cells, from the union of which the spore is developed.

The vast Order of *Algæ* is now often regarded as consisting of several Orders, which I have here distinguished as Suborders, there being so many genera whose position is doubtful amongst these Suborders, and all being so obviously modifications of one common plan, that I think *Algæ* may still be regarded with propriety as a Natural Order, equivalent to such others as *Gramineæ*, *Lichens*, *Fungi*, *Compositæ*, etc. Though so different in habit, locality, and general appearance from Lichens, the absolute difference between these Orders is reduced to a very little in *Lichina* and others. With *Fungi*, also, their affinity is very close; and, finally, some of the unicellular and filamentous genera present appearances at certain stages of their development that render it impossible to say whether they should be referred to the animal or vegetable kingdom.

Marine *Algæ* occur at all depths in the ocean between high tide or its spray, and upwards of 100 fathoms, but they abound most between tidal limits or just beyond them. As a rule, the bright green kinds occur nearest to high-water mark and extend to fresh water; the dark olive-green abound between tidal marks; and the bright red affect deeper water; but to this there are many exceptions. The great seaweed that forms olive-green floating patches girdling the New Zealand harbours (*Macrocystis pyrifera*) I have seen off the Crozet Island, where the soundings gave 40 fathoms, and which there is reason to suppose may hence have been 700 feet long (Fl. Antart. 464).

Iodine, kelp, and soda are the products of this Order, which also contains several plants that are eatable in a raw or cooked state, as *Laver* and *Dulse*, and a copious jelly in the case of the "Carrageen moss" of Ireland, the produce of species of *Chondrus*, *Gracilaria*, and *Gigartina*. Others are used as manure and as fodder for cattle; a valuable cement is made by the Chinese from *Gracilaria tenax*; and knife-handles of the stems of various *Laminariæ* by whalers and others.

New Zealand is very rich in *Algæ*; its deep waters and quiet sounds especially abound in species of this interesting and beautiful Order, which have been most admirably collected by my old friend Dr. Lyall. Amongst the microscopic unicellular and filamentous tribes, there must still be many hundreds, perhaps thousands, of species to be discovered in the sea and in freshwater ponds, rivers, and the islands. These are subjects of special research, far beyond the scope of a student of general botany, or of a handbook like the present. To study them advantageously would require a powerful microscope and a very good library, infinite patience, and considerable manual skill. To those who would undertake these branches I

would recommend Hassall's 'British Freshwater Algæ,' Ralfs's 'British Desmidiæ,' and Kützinger's 'Tabulæ Phycologicæ.'

Of more general works on *Algæ* there are Harvey's 'Manual of British Algæ' and 'Phycologia Britannica,' but especially his 'Nereis Australis' and 'Phycologia Australis,' both admirable works full of beautiful plates of southern *Algæ*. In my Antarctic, New Zealand, and Tasmanian Floras also, many New Zealand species are figured. The best general work, though still incomplete, is J. Agardh's 'Systema Algarum,' an excellent book in all respects.

To my late friend Dr. Harvey I am indebted for the determination and description of the New Zealand *Algæ* in my Flora of these islands. His widely and deeply deplored death during the present year has deprived me and this work of the benefits of his revision of the following compilation.

## KEY TO THE SUBORDERS, TRIBES, AND GENERA.

### SUBORDER I. MELANOSPERMÆ OR FUCOIDEÆ.

(Olive-green or brown Algæ.)

Olive-brown, more rarely olive-green or black, marine *Algæ*, usually large, coarse, much-branched or horizontally expanded. *Frond* continuous or articulate, simple lobed or branched, often bearing distinct leaves, branches, bladders, and receptacles of fructification. *Fructification* on the surface of the frond, or in cavities in its substance; 1, obovoid or ellipsoid, simple or 4-parted *spores*, enclosed in a hyaline membrane, naked, or surrounded by jointed filaments (*peranemata*); 2, oblong *antheridia*, terminating jointed filaments, and containing moving spores (*antherozoids*); 3, buds or leaflets (*propagula*), developed on the surface or edges of the frond, capable of becoming new plants.

Series A. Frond thick, not articulate, its outer stratum formed of minute densely-packed cells.

TRIBE I. **Fuceæ.** *Spores and antheridia in spherical cavities (conceptacles), either sunk promiscuously in the surface of the frond, or confined to proper receptacles.*

§ 1. *Conceptacles in distinct receptacles, not promiscuously sunk in the frond or in its joints.*

\* *Frond with distinct stem, branches, leaves, and bladders (except Turbinaria).*

a. *Receptacles very different from the leaves.*

† *Frond branching from both sides of the stem.*

Receptacles axillary. Bladders distinct from the leaves . . . . . 1. SARGASSUM.

Bladders indistinguishable from the leaves, which are turbinate and peltate . . . . . 2. TURBINARIA.

Receptacles marginal, racemose, cylindric, warted . . . . . 3. CARPOPHYLLUM.

†† *Branches from one edge only of a flattened frond.*

Receptacles marginal . . . . . 4. MARGINARIA.

β. *Receptacles obviously formed of leaves.*

Leaves distinct from the branches, marginal, distichous . . . . . 5. PHYLLOSPORA.

Leaves distinct from the branches, spirally disposed round the stem . . . . . 6. SCABERIA.

Leaves passing into branches . . . . . 7. CYSTOPHORA.

\*\* *Frond with distinct stem and leaves, but no bladders* . . . . . 8. LANDSBURGIA.

\*\*\* *Frond flabellately dichotomously branched, without leaves or bladders* . . . . . 9. FUCODIUM.

§ 2. *Conceptacles scattered over the frond, or sunk in its joints.*a. *Frond with distinct stem and branches.*

- Frond moniliform, internodes inflated . . . . . 10. *HORMOSIRA*.  
 Frond cylindric, proliferously branched . . . . . 11. *SPLACHNIDIUM*.  
 Frond filiform, irregularly branched . . . . . 12. *NOTHEIA*.

- b. *Frond without stem and branches, flabellately expanded and palmately lobed* . . . . . 13. *D'URVILLEA*.

**TRIBE II. *Sporochnoideæ*.** *Spores superficial, collected on proper branches of the frond (receptacles).*

- Frond filiform, cylindric. Receptacles terminated by a pencil of filaments . . . . . 14. *SPOROCHNUS*.  
 Frond filiform, compressed or flat. Receptacles conical or mitriform . . . . . 15. *CARPOMITRA*.  
 Frond compressed or flat, linear; branches pinnate, opposite . . . 16. *DESMARESTIA*.

**TRIBE III. *Laminariæ*.** *Spores superficial, forming cloudy sori of indefinite forms on the frond.*

- Frond terete, slender, undivided, of immense length, bearing at the upper part a series of lanceolate leaves with a bladder at their base . . . . . 17. *MACROCYSTIS*.  
 Frond with an erect, solid, dichotomous trunk, bearing branches and lanceolate leaves without bladders . . . . . 18. *LESSONIA*.  
 Frond broad, pinnatifid, its stipes solid or hollow . . . . . 19. *ECKLONIA*.

**TRIBE IV. *Dictyotæ*.** *Spores superficial, forming dot-like or small sori of definite forms on the frond.*

- Frond flat, dichotomous, flabellate, concentrically striated . . . 20. *ZONARIA*.  
 Frond flat, dichotomous, linear . . . . . 21. *DICTYOTA*.  
 Frond cylindric, membranous, branched . . . . . 22. *DICTYOSIPHON*.  
 Frond saccate, membranous, unbranched . . . . . 23. *ASPEROCOCCUS*.

Series B. Frond not articulate, its outer stratum formed of radiating articulated filaments.

**TRIBE V. *Chordariæ*.**

\* *Frond tubular or saccate, unbranched, filled with fluid.*

- Frond cylindric, septate internally . . . . . 24. *CHORDA*.  
 Frond saccate . . . . . 25. *ADENOCYSTIS*.

\*\* *Frond solid, cylindric, branched; axis of interlaced filaments; periphery of radiating filaments immersed in gelatine.*

- Axis of longitudinal filaments, radiating outwards to form the periphery . . . . . 26. *SCYTOTHAMNUS*.  
 Axis cartilaginous, dense; filaments of periphery unbranched . . . 27. *CHORDARIA*.  
 Axis gelatinous, loose; filaments of periphery branched . . . . . 28. *MESOGLOIA*.

- \*\*\* *Frond solid, hemispherical or tuberos* . . . . . 29. *LEATHESIA*.

Series C. Frond filiform, branched, of superimposed single cells, or of longitudinal series of cells of equal length, hence articulate.

**TRIBE VI. *Ectocarpeæ*.**

- Articulations of 3 or more parallel cells . . . . . 30. *SPHACELARIA*.  
 Articulations of solitary cells . . . . . 31. *ECTOCARPUS*.



## SUBORDER II. RHODOSPERMÆ OR FLORIDÆ.

(Red or purple Algæ.)

TRIBE I. **Rhodomelææ.**

Rosy-red or purple, rarely brown-red or greenish-red marine *Algæ*, flat or filiform. *Fructification* diœcious, organs of three kinds:—1. *Spores*, contained in external or immersed conceptacles, or densely crowded and dispersed in masses (*nuclei*) through the frond. 2. *Tetraspores*, red or purple, external or immersed in the frond, rarely contained in proper receptacles, each enveloped in a pellucid covering, and at maturity separating into 4 sporules, which are arranged crosswise or transversely. 3. *Antheridia*, filled with hyaline or yellow corpuscles (*antherozoids*).

Series A. Spores arranged on tufts of threads (articulated filaments), which spring together from a basal parietal or central receptacle (placenta) within the conceptacle. Single spores formed in all the cells of the thread, or in the terminal cell only.

I. Tufts of spore-threads contained in an external ovate or spherical conceptacle.

a. Placenta on the base of a hollow conceptacle. Spores pyriform or obconic, formed in the terminal cell of the spore-thread.

TRIBE I. **Rhodomelææ.** *Frond articulate or furnished with an articulated axis of many tubes; surface areolated. Spore-threads simple. Tetraspores in series in the branchlets, or in pod-like bodies (Stichidia).*

\* *Frond flat, proliferous (see Amansia in \*\*).*

Frond membranous, costate, obliquely striate . . . . . 32. LENORMANDIA.

\*\* *Frond flat, lobed or pinnatifid.*

Frond costate, transversely striate. Stichidia on the costa . . . 33. EPINEURON.

Frond costa, transversely zoned. Stichidia marginal . . . . . 34. AMANSIA.

\*\*\* *Frond and branches filiform or somewhat compressed.*

† *Frond inarticulate externally; axis articulate.*

Frond laxly reticulate, closely transversely striate above; cortical cells polygonal . . . . . 35. ALSIDIUM.

Frond opaque, often compressed; branchlets filiform, transversely striate; cortical cells minute, polygonal . . . . . 36. RYTIPHLÆA.

Frond opaque, not transversely striate. Stichidia formed of swollen branchlets . . . . . 37. RHODOMELA.

†† *Frond articulate (inarticulate in some Dasyæ).*

a. *Frond an articulate tube, surrounded by tessellated cells. Tetraspores 2-seriate in terminal stichidia . . . . . 38. BOSTRYCHIA.*

Frond opaque or reticulate; joints longitudinally striate, internodes hyaline. Tetraspores 1-seriate . . . . . 39. POLYSIPHONIA.

β. *Frond with articulate unicellular branches. Tetraspore 2-∞-seriate in stichidia . . . . . 40. DASYA.*

†† *Frond minute, filiform, articulate, bearing uniform angular toothed leaflets . . . . . 41. POLYZONIA.*

TRIBE II. **Laurenciææ**. *Frond inarticulate, solid, tubular or septate; surface-cells minute. Spore-threads simple or branched. Tetraspores irregularly scattered through the branchlets.*

\* *Frond hollow, full of fluid; tube septate; septa close together* 42. CHAMPIA.

\*\* *Frond solid, cellular, flat or compressed; branchlets obtuse or constricted at the base.*

Frond terete or compressed . . . . . 43. LAURENCIA.

Frond filiform, articulate . . . . . 44. CHONDRIA.

Frond flat, membranous . . . . . 45. CLADHYMENIA.

\*\*\* *Frond solid, cellular, cylindric or compressed; branchlets distichous, subulate or setaceous or serrate.*

Frond decomposed; branches setaceous, subarticulate. Conceptacles scattered, on long stalks . . . . . 46. ASPARAGOPSIS.

Frond decomposed; branches subulate. Conceptacles sessile on the tips of the branches . . . . . 47. DELISEA.

Frond decomposed, serrate. Conceptacles terminal on the tips of branches. . . . . 48. PTILONIA.

b. Placenta on the base of a hollow conceptacle. Spores roundish or elliptic, in moniliform threads, all the cells of the spore-thread being changed into spores.

TRIBE III. **Corallinææ**. *Frond calcareous, its cells secreting carbonate of lime. Spore-threads separating into 4 spores.*

\* **Corallines**. *Frond branched, filiform, articulate.*

Conceptacles conical, on the disk of the articulations . . . . . 49. AMPHIROA.

Conceptacles urceolate, terminal, smooth . . . . . 50. CORALLINA.

Conceptacles turbinate or urceolate, 2-4-horned . . . . . 51. JANIA.

\*\* **Nullipores**. *Frond crustaceous or foliaceous, inarticulate.*

Frond rigid, crust-like, or branching with the branches stony . . . . . 52. MELOBESIA.

TRIBE IV. **Sphærococcoideæ**. *Frond cartilaginous or membranous. Spore-threads separating into many spores.*

\* **Delesseriææ**. *Tetraspores divided into threes, disposed in definite sori.*

† *Frond foliaceous, symmetrical, costate.*

Costa running through the frond . . . . . 53. DELESSERIA.

Costa slender, vanishing below and above . . . . . 54. HEMINEURA.

†† *Frond foliaceous; costa 0 or faint.*

55. NITOPHYLLUM.

\*\* **Sphærococceæ**. *Tetraspores immersed in the cortical cells, divided cruciately or transversely.*

† *Tetraspores transversely divided.*

§ *Frond with a central articulate tube* . . . . . 56. PHACELOCARPUS.

§§ *Frond without a central tube.*

Frond of 2 strata of cellular tissue . . . . . 57. CALLIBLEPHARIS.

Frond of 3 strata of cellular tissue . . . . . 58. SARCODIA.

†† *Tetraspores cruciately divided (unknown in Melanthalia).*

Frond ecostate, of two strata of tissue . . . . . 59. GRACILARIA.

Frond dichotomously flabellate, of three strata of tissue . . . . . 60. MELANTHALIA.

- c. Placenta axial or parietal, or suspended by filaments in the cavity of the external or half-immersed conceptacles.

TRIBE V. **Gelidiæ**. *Frond inarticulate, cartilaginous or horny, opaque, the axis (at least) formed of elongate confervoid filaments (axis articulate in Caulacanthus when young).*

\* *Conceptacles 2-celled* . . . . . 61. GELIDIUM.

\*\* *Conceptacles 1-celled, traversed by filaments, hemispherical, or, if immersed, in swollen branchlets (unknown in Caulacanthus).*

Frond subtubular; axis articulate when young . . . . . 62. CAULACANTHUS.

Frond cellular, solid. Spore-mass suspended . . . . . 63. HYPNEA.

Frond cellular, solid. Spore-mass lateral . . . . . 64. PTEROCLADIA.

\*\*\* *Conceptacles immersed, scattered over the frond. Spore-mass parietal* . . . . . 65. APOPHLEA.

## II. Tufts of spore-threads not lodged in a hollow conceptacle.

\* *Tufts of spore-threads in wart-like excrescences or tubercles.*

TRIBE VI. **Squamariæ**. *Frond cartilaginous or membranous, horizontally expanded and rooting from the under surface. Spores in moniliform strings within the wart.*

Frond red-brown, flat, fan-shaped . . . . . 66. PEYSSONNELIA.

\*\* *Tufts of spore-threads immersed in the frond.*

TRIBE VII. **Helminthocladieæ**. *Frond cylindric, gelatinous or submembranous, almost wholly composed of filaments set in loose gelatine. Tufts of spores spherical, of branching moniliform spore-threads springing from a central point.*

Outer stratum of moniliform filaments lying in gelatine . . . . . 67. NEMALION.

Outer stratum membranous, thin, of angular cells . . . . . 68. SCINAIA.

\*\*\* *Tufts of spore-threads naked, surrounded with an involucre of branchlets of the frond.*

TRIBE VIII. **Wrangelieæ**. *Frond filiform, of one articulate tube, which is naked or coated with small cells. Spores pyriform, in the terminal cells of branching spore-threads.*

Frond filiform, clothed at the nodes with flaccid capillary filaments 69. WRANGELIA.

Series B. Spores in simple or compound globose masses, enclosed in a hyaline mucous or membranous coat. Spore-masses naked or immersed in the frond, or contained in conceptacles.

## I. Frond inarticulate, flat or cylindric.

TRIBE IX. **Rhodymenieæ**. *Spore-masses in globose conceptacles (sunk in the frond in Dasyphelea). Spores first developed in the cells of moniliform branching filaments issuing from a centre, at length aggregated without order.*

\* *Frond broad, leafy, dichotomous.*

Conceptacles hemispheric, scattered. Tetraspores crucially divided 70. RHODYMENIA.

Conceptacles spherical, submarginal. Tetraspores transversely divided . . . . . 71. RHODOPHYLLIS.

Conceptacles sunk in the frond. . . . . 72. DASYPHELEA.

\*\* *Frond slender, pectinate-pinnatifid* . . . . . 73. PLOCAMUM.

TRIBE X. **Cryptonemieæ**. *Spore-masses in conceptacles or sunk in the frond. Spores developed within solitary or clustered detached cells, at length aggregated without order.*

Subtribe GIGARTINEÆ. *Spore-masses compound.*

- § 1. **Tylocarpææ.** *Frond rigid, compact; inner stratum of roundish polygonal cells outer of densely packed vertical filaments.*

Frond flat, leaf-like. Conceptacles linear, rib-like . . . . . 74. STENOGRAMMA.  
Frond linear, subterete, subcartilaginous . . . . . 75. GYMNOGONGRUS.

- § 2. **Kallymenieæ.** *Frond membranous or coriaceous; inner stratum of longitudinal filaments or of polygonal cells surrounded by these; outer of roundish or polygonal cells, smaller outwards; the cortical of minute vertical filaments.*

Frond flat, dichotomous; inner stratum of large roundish cells in a network of filaments . . . . . 76. CALLOPHYLLIS.  
Frond flat, subsessile, expanded; inner stratum of longitudinal interlaced fibres . . . . . 77. KALLYMENIA.

- § 3. **Eugigartineæ.** *Frond cartilaginous, wholly composed of slender anastomosing longitudinal filaments set in firm gelatine. Tetraspores in sori.*

\* *Spore-mass surrounded by a coat of densely interwoven filaments.*

Frond terete or flat. Spore-mass in an external conceptacle . . . 78. GIGARTINA.  
Frond flat, simple or vaguely cleft. Spore-mass imbedded in the frond . . . . . 79. IRIDÆA.

\*\* *Spore-mass immersed in the frond, with no definite coat.*

Frond flabelliform, dichotomous . . . . . 80. CHONDRUS.

Subtribe CRYPTONEMEÆ. *Spore-masses, simple, rounded.*

- § 4. **Gastrocarpææ.** *Inner stratum of anastomosing filaments or polygonal cells; outer of rows of smaller cells, the outermost smallest and coalescing.*

*a. Conceptacles external, with a defined pericarp.*

Frond flat, forked, ribbed below; inner stratum cellular. Conceptacles on proper leaflets, springing from the lamina . . . . . 81. EPYMENIA.  
Frond linear, tubular, constricted at intervals, thus divided into water-sacs, traversed by longitudinal filaments . . . . . 82. CHYLOCLADIA.  
Frond compressed, tubular, not constricted, full of water and traversed by longitudinal filaments . . . . . 83. CHRYSIMENIA.

*β. Spore-mass immersed in the frond.*

Frond flat or compressed, dichotomous, pinnatifid . . . . . 84. HALYMENIA.

- § 5. **Nemastomeæ.** *Frond composed of two strata of filaments (with rarely an intermediate cellular one); inner stratum longitudinal, interlaced; outer vertical, dichotomously fastigiate. Spore-masses in the N. Z. genera dispersed through the frond (not in separate branches).*

*a. Frond compact, solid, compressed or flat (tubular and soft in some Nemastomeæ).*

Frond with a stratum of roundish cells between the inner and outer filamentous ones . . . . . 85. PRIONITIS.  
Frond of two filamentous strata.  
Frond flat, pinnated. Favellidia with a pore . . . . . 86. GRATELOUPIA.  
Frond compressed, dichotomous or pinnate. Favellidia immersed . . . . . 87. NEMASTOMA.

*β. Frond cylindric, tubular, continuous or constricted at intervals.*

Spore-masses in ovoid or subglobose branchlets . . . . . 88. CATENELLA.  
Spore-masses scattered, in the inner surface of the frond . . . 89. DUMONTIA.



II. Frond filiform, articulate, of one tube. Articulations naked or coated with small cells.

TRIBE XI. **Spyridiæ**. *Spore-masses in an external, closed, cellular conceptacle, consisting of many lesser masses, each formed by the evolution of paniculately branched spore-threads. Spores at length aggregated without order.*

Frond filiform, pinnately decomposed . . . . . 90. SPYRIDIA.

TRIBE XII. **Ceramieæ**. *Spore-masses single, naked or involucrate (by small branchlets). Spores aggregated without order within a hyaline membranous cell, developed externally.*

§ 2. *Tetraspores formed of the cortical cells, more or less sunk in the frond.*

Frond coated with roundish, irregularly placed cells . . . . . 91. CERAMIMUM.

Frond coated with rectangular cells, in longitudinal series . . . . . 92. CENTROCERAS.

§ 2. *Tetraspores formed of whole branchlets, or external cells of these, hence external, stalked or sessile.*

\* *Spore-masses involucrate.*

Frond linear, compressed, opaque, pellucid and articulate at the tips, pinnate and pectinate . . . . . 93. PTILOTA.

Frond filiform, pellucid, trichotomous . . . . . 94. GRIFFITHSIA.

Frond filiform, rigid, pellucid, pinnately decomposed and plumose 95. BALLIA.

\*\* *Spore-masses not involucrate.*

Frond articulate, pellucid, or main stems etc. coated with cells . . . 96. CALLITHAMNION.

### SUBORDER III. CHLOROSPERMÆ.

(Green Algæ.)

Plants almost always grass-green, rarely olive-green or purple, still more rarely red. Propagation by division of the cells, or by the transformation of the cell-contents into spores (called *zoospores*), or more rarely by spores developed in proper spore-cases. Antheridia containing antherozoids have been found in some.—Marine or freshwater plants, or inhabiting damp places.

TRIBE I. **Siphoniæ**. *Frond green, rooting or fixed by its base, simple or compound, of a single filiform branching cell, or of many such uniting to form a spongy frond.—Marine or freshwater.*

Rhizome prostrate, rooting; branches erect, membranous, unicellular; cells filled with a network of branching fibrils . . . . . 97. CAULERPA.

Frond a matted mass of tubules, full of granular green matter, without fibrils . . . . . 98. CODIUM.

Frond of tufted filaments, matted below, irregularly branched above 99. VAUCHERIA.

Frond of free, tufted or solitary filaments, which are pinnately branched . . . . . 100. BRYOPSIS.

TRIBE II. **Dasycladæ**. *Frond green, rooting, of simple or branched, inarticulate, axial threads, with whorled articulate branchlets. Spores spherical, in proper fruit-cells.—Marine, sometimes crusted with lime.—No species has hitherto been sent from New Zealand.*

TRIBE III. **Valoniæ**. *Frond green, rooting, of large bladdery cells, full of coloured fluid, often united into filaments or a network.—Marine.—Not yet sent from New Zealand.*

TRIBE IV. **Ulvēæ**. *Frond green or purple, fixed by its base, membranous, flat or tubular, formed of minute quadrate cells. Fructification, zoospores formed in the cells.*

Frond leaf-like, purple, membranous . . . . . 101. PORPHYRA.

- Fronde leaf-like, green, membranous . . . . . 102. *ULVA*.  
 Frond tubular, membranous, green . . . . . 103. *ENTEROMORPHA*.  
 Frond filiform or expanded, purplish . . . . . 104. *BANGIA*.

**TRIBE V. Batrachospermeæ.** Frond blackish or olive-green or purple, filiform, inarticulate, branching, composed of small cells; branchlets 0 or moniliform and whorled. Fructification moniliform strings of naked spores, forming external tufts or concealed in a tubular frond.—Freshwater.

- Fronde nodose, with whorled moniliform branchlets . . . . . 105. *BATRACHOSPERMUM*.

**TRIBE VI. Confervæ.** Frond green, of articulated filaments, consisting of cylindric cells, that are usually longer than broad, and are full of coloured matter. Antherozoids minute, swarming in the cells.—Marine and freshwater.—There must be an immense number of New Zealand species to be discovered.

- Filaments tufted, branched . . . . . 106. *CLADOPHORA*.  
 Filaments unbranched . . . . . 107. *CONFERVA*.  
 Filaments joined by transverse tubes . . . . . 108. *TYNDARIDEA*.

**TRIBE VII. Zygnemaceæ.** Frond green, of simple articulated floating threads of excessive tenuity, composed of cylindric cells; cell contents of definite form. Spores large, green orange or vermilion-coloured, solitary, formed of the union of the contents of two cells, or the division of the contents of one.—Marine and freshwater Algæ.—Very numerous, not hitherto collected in New Zealand.

**TRIBE VIII. Hydrodictyæ.** Frond green, of cylindrical cells, uniting and forming a saccate network, with polygonal meshes; each side of the mesh formed of a single cell. Cell contents resolving into antherozoids, which arrange themselves and form a new network within the parent cell. Network hence viviparous.—This beautiful freshwater group has hitherto not been detected in New Zealand.

**TRIBE IX. Oscillatoricæ.** Fronds green, attached or floating, rarely olive-brown blue or purple, forming a stratum composed of simple or sparingly branched very minute threads; each thread consists of a membranous pellucid sheath, enclosing an annulate axis of short cells.—Marine or freshwater minute Algæ.—Very numerous in species, but hitherto hardly at all collected in New Zealand.

- Filaments attached, short, tufted, erect, branched . . . . . 109. *CALOTHRIX*.  
 Filaments rigid, usually floating, lying in a mucous matrix . . . . . 110. *OSCILLATORIA*.  
 Filaments free, branched . . . . . 111. *TOLYPOTHRIX*.

**TRIBE X. Nostochinæ.** Fronds olive or bright green, forming gelatinous masses, traversed by moniliform filaments of globose or oval cells, with here and there a larger cell than the others, of whose function nothing is known.—Freshwater pools and on damp ground, often appearing suddenly after rain.—The species are very numerous, and have never been collected or studied in New Zealand.

- Filaments unbranched . . . . . 112. *NOSTOC*.

**TRIBE XI. Desmidiæ.** Microscopic unicellular green Algæ. Cell-wall membranous. Propagation by the cell contents becoming divided in the middle, and a new half-cell being formed at the medial line.—Very minute marine or freshwater Algæ, either parasitic or forming floating masses, usually occurring amongst other Confervæ.—The tribe is a vast one.

**TRIBE XII. Diatomæ.** Microscopic unicellular, yellow-brown Algæ; cell orbicular triangular or of very various symmetric forms; cell-wall siliceous. Propagation as in Desmidiæ.—Microscopic Algæ, marine or freshwater; the siliceous coat of the cell is often exquisitely sculptured, and is a beautiful microscopic object.—The genera and species are extremely numerous, and subject of special study. Dr. Lauder Lindsay has published a catalogue of New Zealand species (see Journ. Linn. Soc. ix. 129).

Frustules few, convex, connate into a stalked flag-shaped frond . . . 113. *ACHNANTHES*.  
 Frustules in longitudinal series . . . . . 114. *SCHIZONEMA*.

TRIBE XIII. **Palmelleæ.** *Frond green red yellow or orange, composed of separate globose or ellipsoid cells, free or in a gelatinous matrix. Propagation by division of the cell contents.—Some of the most simple forms of vegetables belong to this tribe, including the Red Snow of the Arctic regions, which has not hitherto been found in the southern hemisphere. The species have never been collected in New Zealand.*

## SUBORDER I. **MELANOSPERMEÆ.**

### 1. **SARGASSUM**, Agardh.

Roots scutate. Frond olive-brown, pinnately decompound, with distinct stem, midribbed branches, leaves, bladders, and receptacles. Bladders stalked, supra-axillary, simple, usually pointed or terminated by a leaf. Receptacles pod-like, axillary, solitary or fascicled, tubercled or moniliform; tubercles porose, answering to the immersed conceptacles, which contain *tetraspores* and tufted *antheridia*.

A large tropical genus, rarer in temperate and colder seas. The Gulf-weed (*S. bacciferum*) belongs to it.

§ 1. *PTEROPHYCUS*, *J. Ag.*—*Stems flattened, ribbed. Leaves parallel to the stem.*

1. ***S. longifolium***, *Agardh*;—*Fl. N. Z.* ii. 212. Frond 4 feet and upwards long. Stem flat, spirally twisted at the base. Leaves marginal, 5–6 in. long, linear-lanceolate, serrate, costate, lower dichotomously pinnatifid. Bladders spherical or ellipsoid, terminated by a leaf. Receptacles paniced, ovoid, unarmed.—*J. Ag. Sp. Alg.* i. 283. *Anthophycus*, *Kuetzing*. *Fucus*, *Turn. Hist. Fuc.* t. 104.

Shores of New Zealand, *Banks and Solander, D'Urville*. (South Africa, Indian Ocean.)

§ II. *ARTHROPHYCUS*, *J. Ag.*—*Stems flattened, angular or 2-3-edged, branches bent down at their insertion. Leaves horizontal, owing to a twist at their base.*

2. ***S. plumosum***, *A. Rich.*;—*Fl. N. Z.* ii. 212. Frond 1–2 feet long. Stem flat, distichously pinnate, hardly costate. Leaves marginal, of two forms (on the same or different plants); the broader falcate pinnatifid; segments costate, linear-falcate,  $\frac{1}{2}$  in. broad; narrower leaves dichotomously decompound; segments capillary incurved. Bladders size of a pea, stalked, younger mucronate. Receptacles paniced, cylindric, torulose,  $\frac{1}{10}$ – $\frac{1}{8}$  in. long.—*J. Ag. Sp. Alg.* i. 286. *S. pennigerum* and *S. capillifolium*, *A. Rich.* l. c. t. 5 and 6. *S. flexuosum*, *Kuetzing*?

Common on all the coasts.—*Kuetzing* has published a *S. flexuosum*, *Hook. f.*, of which I know nothing. *Harvey* suspects it to be a state of this.

3. ***S. Raoulii***, *Hook. f. and Harv.* *Fl. N. Z.* ii. 212. Stem 2–4 ft. long, slender, smooth, compressed, zigzag, excessively branched. Leaves filiform, flat, dichotomously multifid, ribless. Bladder spherical or ellipsoid, obtuse, broad, solitary at the base of the leaves. Receptacles racemose, smooth, cylindric.—*J. Ag. Sp. Alg.* i. 288; *Harv. Phyc. Austr.* t. 110.

*Banks's Peninsula, Raoul.* (Tasmania.)

4. ***S. adenophyllum***, *Harv. in Fl. N. Z.* ii. 212. Frond 1-2 feet long. Stem 1-2 in., dividing into many slender very long compressed smooth flexuous branches,  $\frac{1}{10}$  in. diameter. Leaves alternate, distichous, long-petioled, dichotomously multifid, lower broader membranous ribbed, upper filiform, with several large prominent glands. Bladders on slender stalks, spherical, shortly mucronate. Receptacles unknown.

Shores of New Zealand, *Lyall*. (Australia.)

5. ***S. scabridum***, *Hook. f. and Harv. Fl. N. Z.* ii. 211. Stems angled, muricate. Leaves oblong-lanceolate, acuminate, toothed, upper very narrow. Bladders scattered, stalked, globose, smooth, not mucronate. Receptacles racemed, stalked, lanceolate, smooth; racemes axillary, shorter than the leaves.—*J. Ag. Sp. Alg.* i. 347.

Bay of Islands, *J. D. H.*; Houraki Gulf, *Lyall*.—Specimens imperfect.

6. ***S. Sinclairii***, *Hook. f. and Harv. Fl. N. Z.* ii. 211. Stems semiterete, angled below, compressed and filiform above. Leaves lanceolate, narrowed at the base, rib vanishing; lower larger, 3-4 in. long, incised and toothed; upper toothed or subentire. Bladders few, shortly stalked, bearing a leaf. Receptacles very short, axillary, sparingly divided, subtended by a minute leaf; lobes smooth, turbinate, abruptly 3-4-horned.—*J. Ag. Sp. Alg.* i. 300.

Common along the shores from the Bay of Islands to Port Cooper, *Sinclair*, etc.

§ III. *EUSARGASSUM*, *J. Ag.*—*Stem flat or terete. Branches ascending (not bent down at their insertion). Leaves horizontal.*

7. ***S. bacciferum***, *Agardh*;—*Fl. N. Z.* ii. 211. Stem much branched, filiform, smooth. Leaves linear-lanceolate, acutely often doubly-serrate, costate, slightly glandular or eglandular. Bladders spherical on a stalk of their own diameter, mucronate. Receptacles  $\frac{1}{4}$  in. long, axillary, in forked racemes, cylindric, warted, unarmed.—*J. Ag. Sp. Alg.* i. 344. *Fucus natans*, *Linn.*; *Turn. Hist.* t. 47.

Shores of New Zealand, *D'Urville*, *Lesson*, *Sinclair* (all tropical and subtropical seas).—This is the Sargasso-weed (or Gulf-weed) of the Atlantic, which forms free floating patches in the ocean, and increases by accidental division of the frond.

Various other species of *Sargassum* are enumerated as natives of New Zealand, but none with any probability of being really so; such are *S. vulgare*, *Ag.*, a plant confined to the Atlantic; *S. granuliferum*, *Ag.*, a native of the Indian Ocean; *S. droserifolium*, *Bory*, an imperfectly-described New Ireland species; *S. crassifolium*, *J. Ag.*, found in the ocean between New Zealand and New Ireland; and *S. duplicatum*, a most imperfectly-described plant found in the ocean between New Zealand and Tahiti. On the other hand, no doubt many Australian species are washed on the New Zealand coasts, and that the number of indigenous and transported species to be found will prove to be large.

## 2. TURBINARIA, Lamouroux.

Root branching. Frond olive-brown, alternately decompose, with distinct stem, leaves or bladders, and receptacles. Leaves confluent with the bladders, which are stalked, turbinate, crowned with a peltate lamina. Re-



ceptacles axillary, pod-like, dichotomously branched, tubercled, the tubercles answering to conceptacles containing obovoid spores.

A genus of one or two species, natives of the Southern Ocean.

1. **T. ornata**, *J. Agardh*;—*Fl. N. Z.* ii. 212. Frond 6–8 in. long, between fleshy and coriaceous. Stem simple. Leaves on bladders, peltate on a triquetrous stalk, rather concave,  $\frac{1}{2}$  in. long, crowned with a double series of stout teeth, one series marginal, the other within it.—*J. Ag. Sp. Alg.* i. 266. *Fucus turbinatus* var. *ornatus*, *Turner, Hist. Fuc.* t. 24. f. c-h.

New Holland, *D'Urville*. (Australia, Chili, Pacific Islands.)

### 3. CARPOPHYLLUM, Greville.

Frond olive-brown, alternately pinnately decompound, with an obscure midrib, with distinct marginal stem, leaves, bladder, and receptacles. Leaves undivided, vertical. Bladder apiculate. Receptacles in alternate fascicles, simple or forked, cylindric, warted, the warts answering to spherical conceptacles containing obovoid spores.

A small genus, natives of the south temperate ocean.

1. **C. Phyllanthus**, *Hook. f. and Harv. Fl. N. Z.* ii. 212. Stem flat, many feet long,  $\frac{1}{8}$  in. broad, uniformly distichously pinnate. Leaves membranous, lower 3 in. long, linear, entire or sinuate-serrate, upper 1–1½ in. long, serrate. Bladders solitary, ovoid, mucronate, as large as a hazel-nut. Receptacles on the marginal teeth,  $\frac{1}{12}$  in. long.—*J. Ag. Sp. Alg.* i. 263. *C. flexuosum*, *Grev.* *Fucus*, *Turn. Hist.* t. 206.

Common on all the shores, *Banks and Solander*, etc.

2. **C. Maschalocarpus**, *Hook. f. and Harv. Fl. N. Z.* ii. 212. More robust and coriaceous than *C. Phyllanthus*. Leaves ecostate, acuminate, quite entire. Bladders pyriform, mucronate. Receptacles very minute.—*J. Ag. Sp. Alg.* i. 264. *Phycobotrys*, *Kuetz.* *Sargassum Phyllanthum*, *A. Rich. Fl. Nov. Zel.* t. 7 et 7 bis. *Fucus*, *Turn. Hist.* f. 205.

Common on all the shores, *Banks and Solander*, etc.

3. **C. macrophyllum**, *Montagne in Voy. au Pôle Sud*, 76. Stem 14 in. long, flat, thin, winged. Frond broadly lanceolate from a very narrow base, serrate and pinnately lacinate. Bladders spherical, very large, leaf-bearing and axillary, as are the minute dichotomously paniculate receptacles.

Shores of **Lord Auckland's** Island, *D'Urville*.—I have seen no specimens.

### 4. MARGINARIA, A. Richard.

Frond olive-green, unilaterally flabellately pinnate. Leaves, bladders, and receptacles distinct. Leaves subconfluent with the stem, dichotomously semi-flabellate, vertical. Bladders in series on the inner upper margins of the leaves. Receptacles in series with the bladders, unilateral, subsimple, terete or compressed, containing spherical conceptacles with obovoid spores.

A small genus, confined to New Zealand and its islands.

1. **M. Boryana**, *A. Rich.*;—*Fl. N. Z.* ii. 213. Frond many feet long, naked below; pinnæ linear, very long,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad, ribless, with hooked serratures. Bladders elliptic-obovoid, as large as a hazel-nut, subapiculate. Receptacles cylindric, 1 in. long, acuminate, simple or sparingly spinous.—Mont. in *Voy. au Pôle Sud*, t. 2 and 3. f. 2; *J. Ag. Sp. Alg.* i. 250.

Common on the shores, *D'Urville*, etc.

2. **M. Urvilleana**, *A. Rich.*;—*Fl. N. Z.* ii. 213. A smaller plant than *M. Boryana*, but hardly distinct specifically, the pinnæ are 1 foot long, gradually dilated, simple or flabellately branched on one side. Bladders smaller, subspherical, not apiculate.—Mont. in *Voy. au Pôle Sud*, t. 3. f. 1. *M. Urvilliana* et *Gigas*, *A. Rich. Fl. N. Z.* t. 3 and 4. *Sargassum Lessonianum* and *Urvilleanum*, *A. Rich.*, *Sert. Astrolab.* 138.

Shores of New Zealand, *Lesson*, etc. **Lord Auckland's** group, *D'Urville*.

### 5. PHYLLOSPORA, Agardh.

Root fibrous. Frond olive-brown, pinnately decomposed, with flat ribless stem, branches, leaves, bladders, and receptacles which are formed of leaves. Bladders marginal, stalked, simple, terminated by a leaf. Fruit diœcious. Conceptacles immersed in small marginal leaves, containing obovoid spores, or antheridia.

A gigantic weed of the Southern Ocean.

1. **P. comosa**, *Agardh*;—*Fl. N. Z.* ii. 214. Frond solitary, 10–30 ft. long. Stem and branches  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad, compressed or flat, 2-edged. Leaves variable, 4–8 in. long, lanceolate or linear, remotely serrate, intermixed with spinous processes.—Harvey, *Phyc. Austr.* iii. t. 153. *Macrocystis*, *Agardh*, *Sp. Alg.* i. 253. *Fucus*, *Labill. Fl. Nov. Holl.* t. 258; *Turn. Hist.* t. 142.

Common on the shores, *Banks and Solander*, etc. (Australia.)

### 6. SCABERIA, Greville.

Root discoid. Frond olive-brown, dendroid, irregularly branched, having distinct stem, leaves, bladders, and receptacles which are often undistinguishable from the leaves. Leaves spirally disposed, peltate, warted, fleshy. Bladders formed of an inflated leaf. Conceptacles immersed in the transformed leaves, containing obovoid spores and tufted antheridia.

The following is the only species.

1. **S. Agardhii**, *Grev.* Frond several feet long, irregularly or alternately branched. Stem below filiform, flexuous, above covered with crowded leaves and bladders. Leaves  $\frac{1}{6}$ – $\frac{1}{3}$  in. diameter, fleshy, with short excentric petioles, vertically compressed, warted above, smooth below. Bladders large, globose, warted.—*J. Ag. Sp. Alg.* i. 352; *Harv. Phyc. Austr.* iii. t. 164. *Castraltia Salicornioides*, *A. Rich. Fl. N. Zeal.* ii. 143.

Below low-water mark, common, *Lesson*, etc. Omitted in the '*Flora Novæ-Zelandiæ*.' (Australia, Tasmania.)

## 7. CYSTOPHORA, J. Agardh.

Root scutate. Frond olive-brown or -green, dendroid, with a distinct stem, branches, and branchlets, the latter more or less leaf-like, or passing into leaves. Bladders (if present) simple. Receptacles pod-like, moniliform or torulose, forming part of the branchlets. Conceptacles containing pyriform spores, and branched filaments bearing antheridia.

A large tropical and southern genus.

§ 1. *Branches from the margin of the stem, bent suddenly down at their insertion.*

1. **C. monilifera**, J. Agardh. Stem flat, several feet long, decom-pound, pinnate,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad; pinnæ inserted on the flat side of the stem, bent down at their insertion with very short truncate alternate branches at the base; pinnules dichotomously pinnate, the ultimate transformed into moniliform filiform apiculate receptacles,  $\frac{1}{2}$ –1 in. long. Bladders stalked, globose, size of a pea, placed towards the bases of the primary pinnæ.—J. Ag. Sp. Alg. i. 241; Harv. Phyc. Austr. v. 245. *Blossevillea*, Decaisne. *Cystoseira retroflexa*, A. Richard. *Fucus*, Turn. Hist. Fuc. t. 155, not of Labillard.

Shores of New Zealand, D'Urville. (Australia, Tasmania.)

2. **C. retroflexa**, J. Agardh, Sp. Alg. i. 242;—Fl. N. Z. ii. 214. Very similar to the preceding, but more robust. Bladders obovoid. Receptacles ensiform, subtorulose—*Fucus*, Labill. Fl. Nov. Holl. t. 260. *Blossevillea caudata*, nob. in Lond. Journ. Bot. vi. t. 414. *B. retroflexa*, Kuetzing.

Abundant on the shores as far south as Lord Auckland's group. (Australia, Tasmania.)

3. **C. retorta**, Agardh;—Fl. N. Z. ii. 214. Lower part of frond as in *C. retroflexa*, upper pinnæ with a nearly terete rachis, subdichotomously branched; axils rounded. Receptacles 2–3 in. long, terete, usually incurved, obscurely torulose.—J. Ag. Sp. Alg. i. 243. *Blossevillea*, Mont.

Shores of New Zealand, Raoul. Lord Auckland's group, Hombrow. (Australia, Ag.)

4. **C. torulosa**, Agardh;—Fl. N. Z. ii. 214. Stem compressed, 1 foot long, nearly simple, alternately pinnate; pinnæ bent down, pinnules subfascicled, passing into clavate torulose obtuse receptacles. Bladders elliptic-spherical.—J. Ag. Sp. Alg. 243; Harv. Phyc. Austr. t. 123. *Blossevillea*, Decaisne. *Fucus*, Turn. Hist. t. 157.

Shores of New Zealand, D'Urville. Banks's Peninsula, Lyall. (Australia, Tasmania.)

§ 2. *Branches distichously pinnate, not bent down.*

5. **C. platylobium**, J. Agardh, Sp. Alg. i. 245.—*C. Lyallii*, Harv. in Fl. N. Z. ii. 214. t. 108. Stem 2–3 feet long, very stout, compressed, grooved, flexuous, 2–3-pinnate; pinnæ from the margins of the frond, naked below, with alternate tubercles; pinnules flat, 2–3 in. long, alternately toothed, barren with obtuse simple teeth, fertile with the teeth prolonged into stalked receptacles which are 1 in. long, ensiform, compressed, elliptic-lanceolate, long acuminate, torulose, with 2 rows of submarginal cavities. Bladders nearly globose, stalked, as large as hazel-nuts.

Foveaux Straits, Lyall. Otago, Lindsay. (Tasmania.)

8. **LANDSBURGIA**, Harvey.

Root scutate. Frond olive-brown, with a distinct stem and leaves, but no bladders; stem filiform, alternately branched. Leaves linear, flat, with a stout midrib, pinnatifid to the middle. Receptacles formed of small oblong toothed leaves near the tips of the branches, containing densely crowded conceptacles on their thickened surfaces; conceptacles with stalked spores and antheridia, mixed with simple filaments.

The following is the only species.

1. **L. quercifolia**, *Fl. N. Z.* ii. 213. *t.* 107. Root solid, 1–2 in. diameter. Stem 3–4 ft. long,  $\frac{1}{4}$  in. diameter at the base; branches filiform, naked and tubercled below. Leaves distichous, alternate, 2–4 in. long, petioled,  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad, pinnatifid to the middle; lobes sometimes toothed, between membranous and coriaceous, midrib produced beyond the middle. Fruiting leaves  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, serrate.—*Phyllospora quercifolia*, nob. in *Lond. Journ. Bot.* 4. 525 (not *Fucus quercifolius*, Turner.)

Bay of Islands and probably elsewhere, abundant, *D'Urville*, etc.

9. **FUCODIUM**, J. Agardh.

Frond olive-brown or green, often black when dry, dichotomously or sub-pinnately branched, cylindric compressed or flat, ribless, leafless, with distinct receptacles. Bladders 0 in the N. Z. species (in the middle of the frond in others). Receptacles terminal or lateral. Conceptacles containing ellipsoid spores surrounded by simple-jointed filaments or fascicled or racemose antheridia, or both.

A small genus, native of both temperate zones. The N. Z. species belong to a peculiar southern section without bladders.

1. **F. gladius**, *J. Agardh, Sp. Alg.* i. 202. Frond 3–4 in. long, as thick as a swan's quill, terete below, compressed above, dichotomously decomposed; segments spreading, truncate or 2-lobed. Receptacles 6 in. long and more,  $\frac{1}{12}$ – $\frac{1}{6}$  in. broad, dichotomously branched; ultimate segments 4 in. long, ensiform.—*Fucus*, Labill. *Fl. N. Holl.* t. 256; *Turn. Hist.* t. 240. *Hermanthalia*, Kuetzing. *Xiphophora Billardieri*, Mont. in *Voy. au Pôle Sud*, t. 7. f. 1; *Fl. N. Z.* ii. 215; *Fl. Antarct.* t. 69. f. 3.

Abundant on rocky shores as far south as **Lord Auckland's** group. (Tasmania, Australia.)

2. **F. chondrophyllus**, *J. Agardh, Sp. Alg.* i. 203.—*Xiphophora*, Mont.; *Fl. N. Z.* ii. 215. Frond 12 in. long; segments linear, erectopatent, lower  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad, upper  $\frac{1}{12}$  in. Receptacles terminal, their ultimate segments very short,  $\frac{1}{6}$ – $\frac{1}{8}$  in. long.—*Fucus*, Brown in *Turn. Hist.* t. 222.

New Zealand, *D'Urville*; Banks's Peninsula, *Iyall*; Otago, *Lindsay*. (Australia, Tasmania.)

10. **HORMOSIRA**, Endlicher.

Root discoid. Frond olive-brown, without distinct organs, dichotomously



branched, moniliform; internodes inflated, fertile. Fruit diœcious. Conceptacles sunk in the periphery of the internodes, containing sessile narrow-pyriform spores and unbranched peranemata.

A small genus, confined to Australia and New Zealand.

1. **H. Billardieri**, *Mont.*;—*Fl. N. Z.* ii. 215. Frond 6–18 in. long, very variable in size and robustness; internodes obconical, wingless.—*J. Ag. Sp. Alg.* i. 199. *Moniliformia*, Bory. *Monilia*, A. Rich.

Var. *a. Banksii*; Harv. *Ner. Aust.* iii. 135. f. 2. Frond divaricate, with spreading branches and wide angles; internodes cuneate, depressed at the summit, the terminal ovoid.

Var. *β. Labillardieri*, Harv. *l. c.* p. 3. Frond elongate, 2–3-chotomous, with narrow angles; internodes ovoid, rounded at both ends, terminal, sometimes cylindric.—*Hormosira Billardieri*, *Mont.*; *Fl. N. Z.* ii. 215.

Var. *γ. Sieberi*, Harvey, *l. c.* p. 4. Frond short, fastigiate, dichotomous; internodes obconic, truncate at the top, base truncate or tapering, terminal ovoid.—*Hormosira Sieberi*, Decaisne;—*Fl. N. Z.* l. c. *H. obconica*, Kuetzing.

Common along all the coasts on tidal rocks, between half and high-water marks, *Banks* and *Solander*, etc. (Australia, Tasmania.)

## 11. SPLACHNIDIUM, Greville.

Root a disk. Frond olive-green, cylindric, proliferously branched; branches saccate, full of mucilage and branched filaments; walls thin, membranous. Fruit diœcious. Conceptacles scattered over the whole frond, attached to the inner surface of its walls; spores linear-oblong, sessile; peranemata simple.

The following is the only species.

1. **S. rugosum**, *Grev.*;—*Fl. N. Z.* ii. 215. Fronds 4–8 in. high; main axis stout, cylindric or clubshaped,  $\frac{3}{4}$  in. diameter; branches sac-like, truncate, 1–2 in. long, surface covered with mamillæ, each furnished with a pore that opens into the spore-cavity beneath.—*J. Ag. Sp. Alg.* i. 186; Harv. *Ner. Austr.* i. t. 14.

Common on rocks near low-water mark from Auckland to Banks's Peninsula, *Lesson*, etc. (Australia, S. Africa.)

## 12. NOTHEIA, Bailly and Harvey.

Frond olive-green, parasitic, filiform, irregularly branched, proliferous, solid, with distinct stem and branches, but no bladders or leaves. Conceptacles scattered over the whole frond under the surface, containing linear-obovate spores and simple peranemata.

A most curious plant, abounding on the *Hormosira*, and to all outward appearances a part of that plant.

1. **N. anomala**, *Bailly and Harvey*;—*Fl. N. Z.* ii. 216. t. 109 A. Fronds solitary, 3–8 in. long, growing from the conceptacles of *Hormosira Banksii*, excessively branched, bushy, cylindric; branchlets narrow, spindle-

shaped, axis of solid interwoven filaments; periphery of radiating coloured filaments.

Probably common, first found by Wilkes's Expedition; Parimahu, *Colenso*; Bank's Peninsula, *Lyall*. (Tasmania, Australia.)

### 13. D'URVILLÆA, Bory.

Root scutate. Frond stalked, dark olive-brown or black, flat, expanded, very thick and coriaceous or honeycombed transversely internally, palmate or pinnate, without distinct organs. Fruit diœcious. Conceptacles scattered over the whole frond in the cortical stratum, containing either obovoid sessile spores or branched filaments bearing obovoid antheridia.

A genus of a few southern huge black *Algæ*, one often forming a load for a man, which are thrown up after every storm on the rocky coasts of the Southern Ocean.

1. **D. utilis**, *Bory in Voy. Coquil. t. i. and ii. f. 1*;—*Fl. N. Z. ii. 216*. Frond dark brown or black, often 30 ft. long, forming an immense flabellate palmately lobed laciniated lamina, contracted at the cuneiform base into a short stipes as thick as the wrist; segments or thongs often 1 in. thick, honeycombed internally.—*J. Ag. Sp. Alg. i. 188. Fucus Antarcticus*, *Chamisso*.

Common on the coasts, especially southwards as far as **Campbell's** Island, and floating in the ocean as far as lat. 62° S. (Chili, Fuegia, Falkland's Islands, Kerguelen's Land.)

### 14. SPOROCHNUS, Agardh.

Frond dull olive-brown or yellow-green, filiform, pinnately decompose, solid, cellular; axis more dense. Receptacles on long slender stalks, narrow cylindric, crowned with a soft long pencil of filaments, surface covered with branching sporiferous filaments; spores obovoid, attached to the sides of the filaments.

A genus found in both temperate zones.

1. **S. stylosus**, *Harv. in Fl. N. Z. ii. 216. t. 109 B.* Frond pale olive-green. 6–8 in. long. Stem filiform, laterally branched; branches scattered or fascicled, simple, elongate. Receptacles sessile, cylindric or elliptic-oblong, crowned by a long style-like process  $\frac{1}{2}$  to  $\frac{2}{3}$  its own length.

Foveaux Straits and Otago Harbour, *Lyall*.

### 15. CARPOMITRA, Kuetzing.

Frond pale olive-green, linear, filiform, compressed or flat and midribbed, irregularly branched, cellular; axis dense. Receptacles ovoid conical or mitriform, terminating the branches, composed of branching filaments whorled round a vertical axis and developing elliptic-oblong spores.

A European as well as southern genus.

1. **C. Cabrerae**, *Kuetz.;*—*Fl. N. Z. ii. 217.* Root of matted fibres. Frond 6–8 in. long, much branched from the very base; branches 2-edged,

terete below, compressed or flat above, much pinnately divided. Receptacles short, conic, sessile on truncate branchlets.—J. Ag. Sp. Alg. i. 177; Harv. Phyc. Brit. t. 14. *Fucus*, Turner, Hist. t. 140.

Probably common, Cook's Straits, *Lyall*; Hawke's Bay, *Colenso*. (Tasmania, Europe.)

2. **C. Halyseris**, *Hook. f. and Harv. Fl. N. Z.* ii. 216. t. 110 A. Frond much broader than in *C. Cabrerae*,  $\frac{1}{4}$ – $\frac{1}{3}$  in. broad, linear, flat, with a distinct midrib.—J. Ag. Sp. Alg. i. 179.

Bay of Islands, *Cunningham*, etc. Probably only a broad form of *H. Cabrerae*.

## 16. DESMARESTIA, Lamouroux.

Root a disk. Frond dull olive-green, linear or filiform, flat or compressed, distichously branched; structure cellular, surrounding in one species a single slender-jointed tube, which traverses the axis; branches when young producing marginal tufts of very slender flaccid branching filaments. Fructification unknown.

A genus of several species, inhabiting both temperate zones.

1. **D. ligulata**, *Lamouroux*;—*Fl. N. Z.* ii. 217. Frond very variable, a foot or more long, flat, membranous, costate, pinnate, with a central articulate tube; pinnæ oblong or linear-lanceolate, decomposed, ultimate serrate or ciliate.—J. Ag. Sp. Alg. i. 169; Harv. Phyc. Brit. t. 115. *Fucus*, Turn. Hist. t. 98.

East coast, *Colenso*; Akaroa, *Lyall*. (Australia, Chili, Fuegia, S. Africa, N. Atlantic.)

2. **D. viridis**, *Lamouroux*;—*Fl. Antarct.* i. 178. Frond a foot long and upwards, slightly compressed, pinnately decomposed, solid, without a central articulate tube, ecostate, ultimate branches capillary, passing into pencils of jointed filaments.—J. Ag. Sp. Alg. i.; Harv. Phyc. Brit. *Fucus*, Turn. Hist. t. 97. *Dichloria*, Greville.

**Lord Auckland's** group, *J. D. H.* (Kerguelen's Land, N. and S. Pacific, N. Atlantic.)

## 17. MACROCYSTIS, Agardh.

Root branching, giving off immensely long slender simple stems, which bear leaves at the surface of the water. Leaves formed by the continued splitting of a primary terminal leaf, developed in second order along the lengthening floating stem, each lanceolate, serrate, ribless, undulate, with a pyriform oblong or subcylindric bladder at its base. Spores superficial on submerged radical leaves, forming clouded sori, ellipsoid, with a hyaline coat, surrounded by densely packed inarticulate clavate peranemata.

A most wonderful well-known southern *Alga*, forming a breakwater of matted fronds in deep water. Only one species is known, the following, which includes all the species of *J. Agardh*, Sp. Alg. i. 155–158, except *M. obtusa* (which is *Phyllospora Menziesii*).

1. **M. pyrifera**, *Agardh*;—*Fl. N. Z.* ii. 217. Stems 50 to perhaps 700 ft. long or upwards. Fronds extremely variable in length and breadth, 2–4 ft. long, 2–6 in. broad, ciliate-serrate.—*Fucus*, Turn. Hist. t. 110.

Var. *Dubenii*, Harv. Phyc. Austr. iv. t. 202. Bladders subcylindric, 6–8 in. long.—*M. Dubenii*, Areschoug.

Abundant on all the rocky coasts. (Throughout the Southern Ocean and along the west coasts of N. and S. America, also found in floating masses to lat. 65° S.)

### 18. LESSONIA, Bory.

Root scutate or branched. Frond with a more or less distinct stem, or sometimes a tree-like trunk, dichotomously branched and bearing leaves, but no bladders. Leaves geminate, formed from the fission of one, between coriaceous and membranous, ovate ensiform or lanceolate, ribless, entire or somewhat toothed. Sori superficial in the middle of the leaf, of narrow ellipsoid spores mixed with clavate inarticulate filaments.

A genus of often huge erect subdendroid *Algæ*, abounding in the Southern Ocean.

1. **L. fuscescens**, Bory in *Voy. Coquil. t. 2. f. 2. et t. 3*;—*Fl. N. Z.* ii. 217. Gregarious, forming submarine miniature forests; trunks sometimes 10 ft. long, cylindric, as thick as the thigh, bearing towards the top short branches with pendulous foliage. Leaves 2–3 ft. long, 1–2 in. broad, linear-lanceolate, toothed, older sinuate.—*J. Ag. Sp. Alg. i. 151*; *Fl. Antarct. t. 167–8 A and 171 D*.

East coast, *Colenso*; Cook's Straits, *Lyall*.—Probably common in all rocky bays. (Chili, Fuegia, Falkland Islands, Kerguelen's Land.)

### 19. ECKLONIA, Hornemann.

Root scutate or dividing into short fibres. Frond olive-green, pinnatifid, ecostate; segments produced from the magnified teeth of a simple lamina, which is contracted to a solid or inflated stem at the base. Sori superficial on the lower part of the pinnæ, of narrow ellipsoid spores, mixed with clavate inarticulate filaments.

Often gigantic weeds, natives of the Southern Ocean, of which one species inhabits also the Canary Islands, and the other, with a long trumpet-like stem, inhabits the Cape of Good Hope.

1. **E. radiata**, *J. Agardh*;—*Fl. N. Z.* ii. 217. Frond 1–2 ft. long; stem solid or sparingly inflated.

Var. *a*. Frond palmately pinnatifid, smooth; lobes subcuneate, spinulose, toothed.—*J. Ag. Sp. Alg. i. 146*. *Fucus*, Turn. Hist. t. 134. *Capea radiata*, Endl.

Var. *b*. *exasperata*. *E. exasperata*, *J. Ag. l. c. 146*; *Fl. N. Z.*—Surface of the frond spinulose.—*Capea biruncinata*, Montague in *Phytogr. Canariens. Crypt. t. 7*; *Fl. Antarct. 160*; *Laminaria*, Bory in *Voy. Coquil. t. 10*.

Var. *γ*. *Richardiana*. *E. Richardiana*, *J. Agardh, l. c. 147*; *Fl. N. Z. l. c.*—Frond elongate, pinnately decompose, smooth; lobes minutely toothed.—*Capea*, Kuetzing.

Var. *δ*. *strobiliformis*. *E. strobiliformis*, *J. Ag. l. c. 147*; *Fl. N. Z. l. c.*—Stem somewhat inflated, 2 feet long; frond pinnately decompose, surface rugose, plaited.—*Capea*, nob. in *Lond. Journ. Bot. 4, 528*; *Laminaria*, *A. Richard, Fl. Nov. Zel. t. 1, 2*.

Common along the shores of the **Northern** and **Middle** Islands, *Banks and Solander*, etc. (Australia, Tasmania, Chili, Canary Islands.)



## 20. ZONARIA, Agardh.

Root woolly. Frond dull yellow or olive-green, flat, ribless, coriaceo-membranous, flabelliform, entire or vertically multifid, concentrically striate, surface cells in radiating lines. Spores pyriform, superficial, scattered or collected into sori, mixed with simple-jointed filaments.

A genus of both tropical and temperate zones.

1. **Z. Sinclairii**, *Hook. f. and Harv. Fl. N. Z.* ii. 218. Fronds tufted, erect, 2-4 in. high, much branched; stem and branches filiform, clothed with rusty tomentum, ending in flat cuneate laminæ 1-1½ in. long, with pale edges, obsolete zones, and fine radiating lines; sides of the laminæ entire or cut.—*J. Ag. Sp. Alg.* i. 111; *Harv. Phyc. Austr.* i. t. 49. *Stypopodium*, Kuetzing.

New Zealand, *Sinclair*. (N. S. Wales.)

2. **Z. interrupta**, *Agardh*;—*Fl. N. Z.* ii. 218. Frond tufted, erect, 4-6 in. high, fastigiately branched, flabellate; stem terete or winged, woolly; segments long, narrow, obtuse, irregularly toothed or pinnatifid; tips cuneate, radiatingly striate.—*J. Ag. Sp. Alg.* i. 111; *Harv. Phyc. Austr.* iv. 190. *Z. flava*, nob. in *Lond. Journ. Bot.* 4. 529 (excl. syn.). *Fucus*, *Turn.* *Hist.* t. 245. *Phycopteris*, Kuetzing.

Common on the shores of the Northern and Middle Islands, *Colenso*, etc. (Australia, Tasmania, S. Africa, Madagascar.)

3. **Z. velutina**, *Harv. in Fl. N. Z.* ii. 218. Fronds densely tufted, 1-2 in. high, sparingly branched; stem densely woolly, widening into a broad flabellate entire or divided lamina, upper surface quite smooth, under covered except round the margin by a dense velvety black-brown mat of fibres. Fructification unknown.

East coast, *Colenso*; Milford Haven and Port Cooper, *Lyall*.

## 21. DICTYOTA, Lamouroux.

Root covered with woolly fibres. Frond linear, pale olive-green or brown, flat, ribless, membranous, cellular, dichotomous or pinnatifid, surface cells parallel. Spores superficial, collected in minute sori, or scattered singly over both surfaces of the frond.

Natives of both temperate zones.

1. **D. Kunthii**, *Agardh*;—*Fl. N. Z.* ii. 219. Frond 1 foot high, distantly dichotomously decompound, narrowed at the nearly glabrous base, sinus acute; segments linear-elongate, quite entire, ¼-½ in. broad, rounded at the apex. Spores scattered in small superficial spathulate leaflets.—*J. Ag. Sp. Alg.* i. 94. *Zonaria*, *Agardh*, *Icon. Ined.* t. 15.

Abundant on the coasts, *J. D. H.*, etc. (Chili.)

2. **D. dichotoma**, *Lam.*;—*Fl. N. Z.* ii. 219. Frond 6-10 in. long,

membranous, dichotomously decompound, narrowed at the somewhat woolly base; segments linear, quite entire, sinus rather acute, segments quite entire; apex obtuse or 2-fid. Sori or spores scattered over the whole surface of the frond except the margin.—J. Ag. Sp. Alg. i. 92. *Zonaria*, Harv. Phyc. Brit. t. 103. *Dichophyllum*, Kuetzing.

Hawke's Bay, *Colenso*; Queen Charlotte's Sound, *Lyall*. (Australia, Tasmania, S. Africa, Red Sea, Gulf of Mexico, North Atlantic.)

## 22. *DICTYOSIPHON*, Greville.

Frond olive-green or brown, tubular, branched, of 2–3 series of cells; inner cells elongate, cylindric; superficial minute, coloured. Spores scattered over the whole surface of the frond.

A genus of only two species, the following and a European one.

1. **D. ? fasciculatus**, *Hook. f. and Harv. Fl. Antarct.* i. 178. t. 69. f. 1. Frond 4–8 in. long, hardly coriaceous, lanceolate in outline; stem fili-form, clothed with numerous short quadrifarious cylindric divided fascicled attenuate or secund branches, 1–2 in. long; branchlets setaceous, erect, all acute, narrowed at both ends. Spores scattered over the whole frond, semi-immersed.—J. Ag. Sp. Alg. i.

**Lord Auckland's** group, *J. D. H.* (Kerguelen's Land, Falkland Island.)

## 23. *ASPEROCOCCUS*, Lamouroux.

Root scutate. Frond pale olive-green, tubular, cylindric or saccate, rarely compressed, continuous, membranous, its walls thin. Spores scattered over the whole frond, in minute sori, roundish, mixed with clavate filaments.

A northern as well as southern temperate genus.—*Encelium*, Agardh.

1. **A. sinuosus**, *Bory*;—*Fl. N. Z.* ii. 219. Frond forming hemispherical lobed expanded sinuous masses, from the size of a hazel-nut to that of the human head, finally cavernous and often laciniose.—J. Ag. Sp. Alg. i. 75.

East coast, Capes Kidnapper and Turnagain, *Colenso*; Otago, *Lyall*. (Australia, Tasmania, Falkland Islands, N. and S. Atlantic, Indian Ocean, and Red Sea.)

2. **A. echinatus**, *Greville*;—*Fl. Antarct.* i. 180. Fronds tufted, 2 in. and upwards long, very variable in diameter, cylindric, clavate, much attenuated downwards. Sori oblong.—J. Ag. Sp. Alg. i. 76.

**Lord Auckland's** group, *J. D. H.* (Australia, Europe.)

## 24. *CHORDA*, Stackhouse.

Root scutate. Frond olive or yellow-brown or greenish, very long, simple, cylindric, tubular, its walls rather thick and fleshy, divided internally transversely by membranous septa. Sori covering the whole surface, consisting of stalked obconic spores and ellipsoid atheridia.

A northern genus, rare in the Southern Ocean.

1. **C. lomentaria**, *Lyngbye*;—*Fl. N. Z.* ii. 218. Frond 1 foot and more long, membranous, almost cylindric, often as thick as the little finger, constricted here and there.—*Scytosiphon*, *J. Ag. Sp. Alg.* i. 126.

East coast, *Colenso*; Waitemata harbour, *Lyall*; **Lord Auckland's** group, *J. D. H.* (Tasmania, Falkland Islands, N. Atlantic and Pacific Oceans.)

## 25. ADENOCASTIS, Hook. f. and Harv.

Root a small disk or shield. Frond a dull green or olive-brown, membranous pyriform sac, on a slender short stalk, hollow or full of water, coated with a thin layer of vertical clavate articulate filaments. Spores pedicelled, pyriform, attached to the base of the filaments and scattered over the whole frond.

The following is the only species.

1. **A. Lessonii**, *Hook. f. and Harv. Fl. N. Z.* ii. 218. Frond 1–3 in. high, coriaceous or of a firm membranous texture; colour dark brown when dry and not adhering to paper.—*J. Ag. Sp. Alg.* i. 124; *Fl. Antarct.* t. 69. f. 2; *Harv. Ner. Austr.* i. t. 48. *Asperococcus*, *Bory in Voy. Coquil.* t. 11. f. 2.

Common on tidal rocks from the Bay of Islands to **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (Fuegia, Kerguelen's Land, Tasmania.)

## 26. SCYTOTHAMNUS, Hook. f. and Harv.

Frond blackish-olive, cylindric, branched, fibrous, nearly solid; axis of densely interwoven filaments, which radiate outwards and form a dense cortical substance of minute coloured cells immersed in gelatine. Spores oblong, immersed amongst the cortical cells.

The only species is the following.

1. **S. australis**, *Hook. f. and Harv. Fl. N. Z.* ii. 219. Frond 2–12 in. long, very variable, simple or excessively branched. Stem simple, at the base as thick as a crowquill, terete; branches more slender, acute, firm, rather rigid, ultimate acuminate.—*J. Ag. Sp. Alg.* i. 64.

Common on tidal rocks, *J. D. H.*, etc.

## 27. CHORDARIA, Agardh.

Root discoid. Frond olive-green, filiform, much branched, cartilaginous; axis of densely-packed longitudinal interlaced cylindrical filaments; periphery of simple clavate horizontal whorled filaments, and long byssoid gelatinous fibres. Spores obovoid, scattered amongst the filaments of the periphery.

Medium-sized *Algæ*, natives of both temperate zones.

1. **C. sordida**, *Bory*;—*Fl. N. Z.* ii. 219. Frond 1–2 ft. long, flaccid; stem short, soon divided, or long and laterally branched; branches long, simple or with horizontal branchlets; young frond densely clothed with

slender articulate filaments, which are thrown off as the peripheric cells are developed. Spores small, ellipsoid.—*Myriocladia Capensis*, J. Ag. Sp. Alg. i. 54.

On rocks, probably common. Cook's Straits, *Lyall*; East coast, *Colenso*; Otago, *Lindsay*. (E. and W., tropical, and S. Africa, S. America.)

2. **C. flagelliformis**, *Agardh*;—*Fl. Antarct.* i. 180. Frond 1–2 ft. long, as thick as a crowquill, filiform, equal throughout, excessively branched; branches dense, elongate, simple or forked, scarcely attenuate, often a foot long; filaments of the periphery clavate.—J. Ag. Sp. Alg. i. 66; Harv. Phyc. Brit. t. iii.; Turn. Hist. Fuc. t. 85.

**Campbell's** Island, *J. D. H.* (Chili, S. Africa, N. Atlantic and N. Pacific Oceans.)

## 28. MESOGLOIA, Agardh.

Frond olive-green or brown, filiform, much branched, gelatinous; axis of longitudinal subsimple interlaced fibres, immersed in gelatine; periphery of radiating dichotomous coloured filaments. Spores ovate or elliptic, olivaceous, attached to the branches of the peripheric filaments.

Medium-sized flaccid *Algæ*, natives of both temperate zones.

1. **M. intestinalis**, *Harvey in Fl. N. Z.* ii. 220. Frond 1–2 ft. long, or more, soft, clothed with villous filaments, simple or sparingly divided,  $\frac{1}{12}$  in. at the base, gradually widening to  $\frac{1}{2}$  in., then elongate and cylindric; branches few, irregularly inserted, obtuse; axial filaments loose, branched, peripheric fascicled, cylindric, not moniliform, widening upwards, outer joints as long as broad. Spores oblong, 2 or more in each fascicle.

Cook's Straits, Auckland, and Otago, *Lyall*, *Lindsay*.

## 29. LEATHESIA, Gray.

Frond olive-green, solid, forming globose or lobed masses, between fleshy and cartilaginous in texture, formed of jointed colourless dichotomous filaments radiating from the points of attachment, the tips closely packed and coloured forming the surface. Spores pyriform or ovoid, attached to the coloured tips of the filaments.

A small genus of annual *Algæ*, natives of both temperate zones.—*Corynophlæa*, Kuetzing.

1. **L. Berkeleyi**, *Harvey, Phyc. Brit. t.* 176;—*Fl. N. Z.* ii. 220. Frond dark brown, gregarious, convex, depressed, solid, 1–2 in. diameter, soft and fleshy; filaments very densely packed. Spores pyriform.—J. Ag. Sp. Alg. i. 51.

Cape Kidnapper, *Colenso*. (Europe.)

## 30. SPHACELARIA, Lyngbye.

Frond olive-green, rigid, filiform, excessively and often fastigiately branched, jointed throughout; branches distichous, pinnate, rarely dichotomous; joints of numerous longitudinal cells; tips of the branches distended, membranous,



containing a dark granular mass. Spores ovoid or globose, borne on the branchlets.

Small perennial *Algæ*, natives of all seas.—*Stypocaulon* and *Halopteris*, Kuetzing.

§ 1. *Frond pinnate, woolly at the base.*

1. ***S. paniculata***, Suhr;—*Fl. N. Z.* ii. 221. Frond variable in size, aspect, and ramification, 3–6 in. long, pinnately-decompound, woolly, caulescent, pinnæ fascicled; fascicles more or less corymbose. Spores in terminal spikelets, or clustered; dense tufts of grumous cells sometimes occur in the axils of the uppermost branchlets.—*J. Ag. Sp. Alg.* i. 46. *S. hordeacea*, Harv. in Hook. Ic. Pl. t. 614. *S. virgata*, nob. in Lond. Journ. Bot. iv. 530.

Abundant on all the coasts. (Australia, Tasmania, S. Africa.)

2. ***S. funicularis***, Mont. in *Voy. au Pôle Sud*, t. 14. f. 1;—*Fl. N. Z.* ii. 221. Shorter and stouter than *S. paniculata*.—*J. Ag. Sp. Alg.* i. 38; *Fl. Antart.* i. 180.

Akaroa, *Hombroa*, *Lyall*; East coast, *Colenso*. **Lord Auckland's** group, *J. D. H.*

§ 2. *Frond dichotomous, not woolly.*

3. ***S. botryoclada***, Hook. f. and Harv. *Fl. N. Z.* ii. 221. t. 110 B. Frond slender, several inches long, filiform, sparingly branched, inarticulate, bearing dense spherical tufts of fertile filaments or branchlets throughout its whole length and on all sides; branchlets of the tufts incurved, dichotomous, bearing lateral sessile spores.

East coast and Cook's Straits, *Lyall*.—Harvey suspects that this curious plant, of which we have imperfect specimens only, may prove a state of *S. paniculata*.

§ 3. *Frond parasitic, very minute.*

4. ***S. pulvinata***, Hook. f. and Harv. *Fl. N. Z.* ii. 221. t. 110 C. Fronds forming dense hemispherical or globular brown or olive-green patches  $\frac{1}{12}$ – $\frac{1}{8}$  in. diameter; filaments rigid, arcuate, simple or sparingly branched, brown at the tips; branchlets erect, often secund; articulations of about 3 cells. Spores secund, rarely opposite, pedicelled, ellipsoid-oblong.

Parasitic on *Carpophyllum Maschalocarpus*, *Colenso*.

### 31. ECTOCARPUS, Lyngbye.

Frond flaccid, olive or brown, capillary, jointed; joints of a single cell, not striated. Spores spherical or elliptic, external or imbedded. Lanceolate linear or conical bodies (silicules) also occur, and granular masses formed in connective cells of the branches.

A very large genus in the northern hemisphere, of small annual *Algæ*.

1. ***E. granulosus***, Agardh;—*Fl. N. Z.* ii. 222. Fronds olive-green or yellowish, 2–8 in. high, rigid, decompound; branches and branchlets opposite, ultimate usually secund pectinate; articulations  $1\frac{1}{2}$  as long as broad. Spores obovoid, secund on the upper branches.—*J. Ag. Sp. Alg.* i. 21; Harv. Phyc. Brit. t. 200. *E. ochraceus*, Kuetzing.

East coast, *Colenso*, parasitic. (N. and S. Atlantic Oceans.)

2. **E. siliculosus**, *Lyngbye*;—*Fl. N. Z.* ii. 222. Fronds  $\frac{1}{12}$  in. long, olive-yellow, soft, decomposed; branches and branchlets alternate, ultimate elongate, distant, often secund. Silicules stalked, subulate, or conical and very acute, subsecund.—*J. Ag. Sp. Alg.* i. 22; *Harv. Phyc. Brit.* t. 162.

Common on all the coasts, *J. D. H.*, etc. (Tasmania, N. and S. Atlantic Oceans.)

3. **E. confervoides**, *Harv. in Fl. N. Z.* ii. 222. Fronds tufted, 2–4 in. high, rather coarse, dense, not adhering to paper; stems rigid, distantly branched; branchlets few, simple, scattered, erect or patent, axils all acute. Silicules elongate, terminal, or imbedded in the branches.

Cook's Straits and Otago, *Lyall*.

4. **E. ? pusillus**, *Griffiths*;—*Fl. N. Z.* ii. 222. Fronds parasitic, tufted, pale brown, capillary, matted; stems slender, long, simple or slightly branched; branches distant, naked, horizontal; articulations twice as long as broad in European specimens, much shorter in N. Z. ones. Spores (not seen in N. Z. plants) abundant, sessile, oblong.—*Harv. Phyc. Brit.* t. 153.

Parasitic on Corallines. Hawke's Bay, *Colenso*.—Doubtful, no fruit having been found. (Britain.)

## SUBORDER II. RHODOSPERMEÆ.

### 32. LENORMANDIA, Sonder.

Frond dull red, leaf-like, proliferous. Leaf-like branches flat, membranous, simple; midrib evident, surface striated obliquely; substance honeycombed with rhomboidal cavities; surface-cells minute. Conceptacles scattered, stalked, enclosing pyriform spores. Stichidia lanceolate, containing 3-partite tetraspores.

A small Australian and New Zealand genus.

1. **L. Chauvinii**, *Harv. in Fl. N. Z.* ii. 222. Leaves  $1\frac{1}{2}$ –3 in. long;  $\frac{1}{12}$ – $\frac{1}{2}$  in. wide, dark purple when fresh, thickish, rigid, and semi-opaque when dry, shortly stalked, broad, linear-oblong, obtuse, quite entire; nerve slender, evanescent, proliferous. Stichidia thickly fringing the margin or on the nerve, lanceolate, simple or multifid.

East coast, *Colenso*; Otago, *Lyall*.—Harvey says of this, that he first received it from New Holland, but I do not find it in his enumeration appended to the '*Phycologia Australis*.'

### 33. EPINEURON, Harvey.

Frond dark red, flat, linear, toothed or ciliated, membranous or horny; midrib evidently distichously branched, transversely striate; interior of large angular colourless cells; cortical of many series of minute coloured cells. Stichidia lanceolate, incurved or circinate, placed on the costa, containing 2 rows of tetraspores.

A small genus, of medium-sized southern *Algæ*.

1. **E. Colensoi**, *Hook. f. and Harv. Fl. N. Z.* ii. 223. Frond red-brown, very narrow,  $\frac{1}{12}$  in. broad, rigid, alternately branched above; branches

3-4 in. long, simple or 1-2-pinnate, linear, deeply toothed, transversely striate; tips involute when dry.—Harv. Ner. Austr. xxvi. t. 10. *Vidalia*, J. Ag. Sp. Alg. ii. 1127.

East coast, *Colenso*; Bay of Islands, *Lyll*.

2. **E. ? lineatum**, *Hook. f. and Harv. Fl. N. Z.* ii. 223. Frond pink, membranous, forked, 4 in. and upwards long; stem cylindric at the base, winged above and passing into the flat frond; branches  $\frac{1}{2}$ -1 in. long, linear, ultimate fringed with spreading teeth.—Harv. Ner. Austr. 27. *Fucus*, Turn. Hist. Fuc. t. 201. ? *Amansia multifida*, J. Ag. Sp. Alg. ii. 1112.

**New Zealand**, *Banks and Solander*.—Described by Harvey from the figure in Turner's work; the plant has been found by no recent collector. J. Agardh refers it doubtfully to a tropical Atlantic plant.

### 34. AMANSIA, Lamouroux.

Frond dull red, flat, membranous, pinnatifid, transversely zoned and striate; midrib evident; structure of a single layer of oblong hexagonal cells of equal length, giving the striated appearance. Conceptacles ovate or globose, enclosing a tuft of pyriform spores. Stichidia simple or branched, marginal or superficial, containing a double row of tetraspores.

A small tropical and southern genus.

1. **A. ? marchantioides**, *Harv. in Fl. N. Z.* ii. 223. Frond in flat flabellate patches, 1 in. and upwards across, rooting from the under-surface, lobed or pinnatifid; lobes overlapping, ascending, crenate and toothed, variable in size, membranous, nerveless, transversely zoned, and with radiating striæ; areolate with oblong cells.

Hawke's Bay and Cape Kidnapper, on tidal rocks, *Colenso*.—An immature plant of very doubtful genus.

### 35. ALSIDIUM, Agardh.

Frond red, filiform or compressed, cartilaginous, opaque, pinnately or irregularly decomposed; axis articulated, of numerous tubular cells, coated with cortical layers of numerous small coloured irregular cells; branches alternate, subulate, acute, transversely striate. Conceptacles containing a tuft of pyriform spores, enclosed in a membrane. Stichidia axillary or terminal, containing 1 or 2 rows of 3-parted tetraspores.

1. **A. triangulare**, *J. Ag.*;—*Fl. N. Z.* ii. 223. A native of the West Indies; has, probably erroneously, been said to have been brought from New Zealand by Banks.

### 36. RYTIPHLŒA, Agardh.

Frond dull red, usually wrinkled when dry, filiform or compressed, pinnate, reticulate; axis articulate, of a circle of large oblong cells surrounding a central cell; walls of several series of minute angular cells, the outer coloured. Fructification diœcious. Conceptacles ovate, containing a tuft of pyriform spores. Stichidia lanceolate, containing 3-partite tetraspores (tetraspores sometimes scattered in the ultimate branchlets).

A genus of both temperate zones.—Scarcely different from *Rhodomela*, or from the opaque series of *Polysiphonia*, Harv. Ner. Austr. 31.

1. **R. delicatula**, *Hook. f. and Harv. Fl. N. Z.* ii. 224. *t.* 112 D. Frond tufted, setaceous, 2 in. high, distichously pinnate above, pellucidly striate; branches corymbose and fastigiate, again pinnate or 2-pinnate, margined with subulate spreading branchlets, which are crowded towards the tips; axis of 4 large tubes surrounding a central one, all coated with smaller cells. Conceptacles ovoid, sessile on the larger pinnæ.

Cook's Straits and Akaroa, *Lyall*.

*R. pinastroides*, J. Ag.—A European plant, has been erroneously stated to be a native of New Zealand. See *Fl. N. Z.* ii. 222.

### 37. RHODOMELA, Agardh.

Frond dull red, terete, dendroid, inarticulate, solid, coated with minute polygonal coloured cells; axis articulate, of many large colourless tubular cells. Conceptacles enclosing a tuft of pyriform spores. Stichidia formed of swollen branchlets, and enclosing one or several rows of tetraspores.

Natives of both temperate zones.

1. **R. Gaimardi**, *Ag.*;—*Fl. N. Z.* ii. 225. Frond cylindric, setaceous, dark coloured, 4–6 in. high, simple below, above divided into 3–4 principal branches, which are subdichotomous or irregular, repeatedly 2-fariously branched; secondary and tertiary long, subsimple, loosely set with short branchlets, which are  $\frac{3}{8}$ – $\frac{1}{4}$  in. long, slender, and often secund.—*Fl. Antarct.* 481. *t.* 184; Harv. Ner. Austr. 35. *R. Hookeriana*, J. Ag. Sp. Alg. ii. 880.

Hawke's Bay, *Colenso*, to Akaroa, *Lyall*, probably common. (Fuegia and the Falkland Islands.)

2. **R. cæspitosa**, *Harv. in Fl. N. Z.* ii. 225. Frond 2 in. high and upwards, densely tufted; stem naked below, setaceous, very slender, forked; branches alternately decompound above, subfastigiate, arcuate; branchlets scattered, secund, or alternate; ultimate linear, subulate, arcuate, acute, coated with small cells, opaque under the microscope. Axial tubes 4, their joints visible externally. Stichidia densely crowded on the sides of the upper branches, linear-subulate, simple or branched, with one series of tetraspores.

Rocks near low-water mark, Parimahu, etc., *Colenso*.—"Colour bright emerald-green," *Col.*

3. **R. concinna**, *Hook. f. and Harv. Fl. N. Z.* ii. 225. *t.* 111. Root a woolly disk. Frond 8–12 in. high, opaque, as thick as a sparrow's quill, ovate in outline, repeatedly distichously pinnate; main lower branches sub-horizontal, upper spreading, pinnately decompound; penultimate pinnæ  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, close-set with uniform alternate dichotomously multifid pinnules,  $\frac{1}{12}$ – $\frac{1}{6}$  in. long, which are inserted distichously, but themselves branch in all directions, the branchlets spinous. Stichidia sessile, oblong, acute. Tetraspores in several series.

Foveaux Straits and Chalky Bay, *Lyall*.



4. **R. glomerulata**, *Mont. in Voy. au Pôle Sud*, 141. Frond red, cartilaginous, rigid, 2 ft. long, terete, filiform, inarticulate, flexuose, excessively branched from the base, longitudinally striate when dry, dark brown; branches corymbose, lateral branchlets simple or forked, bearing tufts of sessile oblong or ovate-lanceolate stichidia in the fork; tubes about 7. Conceptacles minute, ovoid.—*Harv. Ner. Austr.* 36; *J. Ag. Sp. Alg.* 889. *R. ? Gaimardi*, *Mont. in Voy. au Pôle Sud*, 140, not of Agardh. *R. ? botryocarpa*, *J. Ag. l. c.* 882. *Polysiphonia botryocarpa*, *Fl. Antart. t.* 70; *Harv. Ner. Austr.* 57; *Fl. N. Z. ii.* 230.

**Lord Auckland's** group, *D'Urville, J. D. H.*; *Akaroa, Raoul*; Otago and Foveaux Straits, *Lyall, Lindsay*.

### 38. BOSTRYCHIA, Montagne.

Frond dull red-purple, filiform, inarticulate or obscurely articulate with short joints, irregularly pinnately branched; axis an articulate tube, surrounded by one or more series of large coloured surface cells; branchlets hooked. Conceptacles terminal, ovoid, enclosing a tuft of pyriform spores. Stichidia terminal, spindle-shaped, containing a double row of tetraspores.

A beautiful genus of many small tropical and temperate *Algæ*.

1. **B. mixta**, *Hook. f. and Harv. Fl. N. Z. ii.* 225. Frond  $\frac{1}{2}$  in. long, dull dark purple, rather rigid, pinnate; pinnæ patent, simple or forked, with alternate subulate divaricate pinnules; tips straight, of the younger incurved; surface-cells hexagonal; axile in one row. Stichidia curved.—*Harv. Phyc. Austr. iii.* 176 A; *Ner. Austr.* 70.

On rocks near high-water mark. Bay of Islands, *J. D. H.* Otago, *Lyall*. (Tasmania, S. Africa.)

2. **B. Harveyi**, *Montagne*;—*Fl. N. Z. ii.* 225. Fronds 1–3 in. long, deep purple, cartilaginous, capillary, 2–3-pinnate, angularly flexuous; pinnæ distichous, alternate, patent; pinnules 2–3-fid or multifid, terminal involute; surface-cells minute, quadrate; axile in several rows.

On rocks near high-water mark. Paterson's Harbour, *Lyall*. (Australia, Chili.)

3. **B. distans**, *Harv. in Fl. N. Z. ii.* 226. Very near *B. Harveyi*, but laxer and more straggling; branchlets simple or nearly so, more distant; tips less incurved. Perhaps only a variety.

Freshwater streams, Kowhaia, *Colenso*. Wellington and Banks's Peninsula, *Lyall*. (Tasmania.)

4. **B. Arbuscula**, *Harv. in Fl. N. Z. ii.* 226. Frond 1 in. high, robust, much thicker than a hog's bristle, erect, densely tufted, compressed. Stem naked below or with broken branchlets only, above densely clothed with short, erect, closely 2-pinnate branches; pinnæ erect, subulate, acute or mucronate; tips strict; axils acute. Structure solid, of 8 primary tubes surrounded with densely-packed minute cells in several series. Fructification unknown.

Otago, *Lyall, Lindsay*.

## 39. POLYSIPHONIA, Greville.

Frond, rose-red or purplish, filiform or capillary, articulate; joints striate, of few or many long tubular cells surrounding one or a few smaller central ones, the whole sometimes coated with a series of minute cortical cells. Conceptacles ovate or urceolate, enclosing a tuft of pyriform spores. Tetraspores sunk in swollen branchlets.

An immense genus, found in all oceans, but chiefly the temperate; the species are most difficult of discrimination and of definition: very many more are to be found in New Zealand than are here recorded. The most important characters for sectional purposes, are whether the primary stem creeps or is erect; whether the articulations are naked or coated with cortical cells; and the number of parallel tubes in each joint surrounding the central one. Secondary characters, all very variable, are afforded by size of frond, habit, ramification, colour, and comparative rigidity or flaccidity of stem and branches. The fructification is very uniform. Some species are with difficulty distinguished from *Dasya* and *Rhodomela*. I have adopted Agardh's classification as far as I can. Harvey divides the genus as follows:—

## HARVEY'S CLASSIFICATION.

Subgenus I. **Oligosiphonia**. Primary tubes 4, rarely 5.

§ 1. **ELONGATÆ**. Stem opaque, inarticulate. Branches articulate.—10, *dumosa*; 19, *Lyallii*.

§ 2. **DICHOTOMÆ**. Frond all pellucid, articulate, subdichotomous, decompound.—11, *strictissima*; 13, *abscissa*; 9, *rudis*; 7, *implexa*; 8, *macra*; 17, *brachygona*; 14, *variabilis*; 15, *nana*; 16, *rhododactyla*; 12, *amphibia*; 1, *Colensoi*.

Subgenus II. **Polysiphonia**. Primary tubes numerous.

§ 5. **BYSSOIDÆ**. Frond alternately branched, with 1-tubed branchlets.—23, *australis*.

§ 6. **PUNICÆ**. Frond purplish, vaguely branched; lateral branchlets dichotomous, many-tubed. Tubes 6–8.—18, *P. Brodiaei*?; 6, *P. neglecta*; (*P. punicea* see *Dasya Berkeleyi*).

§ 7. **PENNATÆ**. Frond rose-colour or purple, often distichously pinnate; branchlets simple, subulate, alternate or 4-farious. Tubes 12–16.—2, *dendritica*; 3, *ceratoclada*; 4, *Sulivance*; 5, *pennata*.

§ 8. **CANCELLATÆ**. Frond brown, black when dry, shrubby, furrowed, vaguely branched; branches decompound. Tubes 7, rarely 8 or 9.—25, *cancellata*; 24, *decipiens*; 26, *aterima*; 27, *ramulosa*.

§ 9. **ATROVUBESCENTES**. Fronds red-brown or blackish, darker when dry, cylindric, vaguely or pinnately branched; branchlets decompound. Tubes 10–16 or more.—20, *corymbifera*; 21, *comoides*; 22, *isogona*; 28, *nigrescens*.

§ 11. **BOTRYOCARPÆ**. Frond more or less inarticulate, tall, red, brown when dry, cells anastomosing. (*P. botryocarpa*, see *Rhodomela glomerulata*.)

## J. AGARDH'S CLASSIFICATION.

§ 1. **Ptilosiphonia**.—Primary stem erect or creeping, distichously or 2-fariously pinnate. Articulations naked or coated with small cells. Tubes 4–16.

a. **DENDRITICÆ**. Small, parasitic; primary stem creeping; pinnae appressed or ascending; articulations naked. Tubes 4–8 or more.

1. *P. Colensoi*; 2, *dendritica*.

β. PECTINATÆ. Small, parasitic; primary stem creeping; pinnæ vertical, 2-farious; articulations naked. Tubes 8-16.

3. *P. ceratoclada*; 4, *P. Sulivana*.

γ. PENNATÆ. Stem erect or creeping, growing on rocks, distichously or pinnately decompound; articulations naked (or coated with small cells). Tubes 5-16.

5. *P. pennata*.

§ II. **Herposiphonia**.—Usually small. Primary stem creeping, secondary erect, branched all round. Articulations naked. Tubes usually many.

α. OBSCURÆ. Fronds small, forming spreading tufts. Primary stem ereeping, branches erect.

6. *P. neglecta*.

β. INTRICATÆ. Fronds less tufted, creeping amongst other *Algæ* or floating, intricate; threads often rooting.

7. *P. implexa*; 8, *macra*; 8, *rudis*; 10, *dumosa*.

§ III. **Oligosiphonia**.—Fronds large, branched on all sides; articulations naked or coated with small cells. Tubes 4.

α. URCEOLATÆ. Tufts stemless, erect; branches and branchlets soft, flaccid, twiggy above; articulations naked (or the lower only coated with cells).

11. *P. strictissima*; 12, *amphibia*; 13, *abscissa*; 14, *variabilis*; 15, *nana*; 16, *rhododactyla*.

β. VIOLACÆÆ. Caulscent. Stem firmer, clothed with flaccid fascicled or penicillate branches; lower or all the articulations coated with small cells.

17. *P. brachygona*; 18, *Brodiaei*?

γ. HYSTRICES. Fronds subpinnately decompound; branches rather rigid, ultimate subulate or spinescent; articulations coated with small cells.

19. *P. Lyallii*.

§ IV. **Polysiphonia**.—Fronds erect, branching all round; articulations with 5 or more tubes, rarely coated with small cells (never in the N. Z. species).

α. ATRO-RUBESCENTES. Fronds red-brown or purplish; branches dichotomous, attenuated upwards. Tubes 9-14.

20. *P. corymbifera*; 21, *comoides*; 22, *isogona*.

β. BYSSOIDEÆ. Fronds pinnately decompound; branches various, branchlets soft, of a single tube; articulations. Tubes 7.

23. *P. australis*.

γ. CANCELLATÆ. Frond pinnately decompound; branches all similar, or the shorter soft or spinescent; articulations very soft. Tubes 7-10.

24. *P. decipiens*; 25, *cancellata*; 26, *aterrima*; 27, *ramulosa*.

δ. NIGRESCENTES. Frond subpinuately compound; branches all similar, soft, twiggy. Tubes 12-20.

28. *P. nigrescens*.

1. **P. Colensoi**, *Hook. f. and Harv. Fl. N. Z.* ii. 229. t. cxii. C. Frond erect, dark coloured when dry. Stem 1-2 in. long, stout; articulations everywhere pellucid, 4-angled, branched from every side; branches alternately decompound, giving off simple and pinnate branchlets from each node; articulations of 4 tubes, which are square in outline, their walls thick. Conceptacles on the larger branches, ovate-globose, pedicelled.—J. Ag. Sp. Alg. 915.

Parasitical on *Fucoideæ*, *Colenso*.—Habit and ramification of *P. ceratoclada*.

2. ***P. dendritica***, *Hook. f. and Harv. Fl. N. Z.* ii. 232. Frond  $1\frac{1}{2}$ –2 in. long, ovate. Stem prostrate, attached by its whole length, compressed, undivided, 3-pinnately branched; branches alternately simple and 2-pinnate, long, spreading; pinnules likewise alternately simple and 2-pinnate; articulations very short, of many tubes, hence striated. Conceptacles terminal, globose-urceolate, oblique, with a prominent mouth.—*J. Ag. Sp. Alg.* 916; *Harv. Ner. Austr.* 47. *Hutchinsia*, *Ag.*

Parasitic on various *Fuci*, abundant. (Australia, S. America.)

3. ***P. ceratoclada***, *Mont.*;—*Fl. N. Z.* ii. 232. Frond 1–4 in. high, rigid, red-brown, erect from creeping filaments, compressed, undivided below, then giving off alternate lateral branches. Stem and branches furnished throughout with frequent subulate patent or recurved acute branchlets; articulations with 12–16 tubes. Conceptacles solitary, large, sessile or shortly stalked.—*Mont. Voy. au Pôle Sud*, i. 130. t. 5. f. 2; *Fl. Antarct.* t. 76. f. 2; *Harv. Ner. Austr.* 48; *J. Ag. Sp. Alg.* 923.

Parasitical on other *Algæ*, from the east coast, *Colenso*, to **Lord Auckland's** group, *D'Urville*, etc.

4. ***P. Sulivanæ***, *Hook. f. and Harv. Fl. N. Z.* ii. 232. Frond slender, 1–2 in. high, red-brown, much flabellately branched, flaccid. Stem a creeping thread; branches fastigate, alternately decompound, with 3 subulate simple branchlets from as many successive nodes, and then a pinnated branchlet from the following node and so on; branchlets patent, curved, alternate or secund, terminal almost circinate; articulations with 12 tubes, of the branches twice as long as broad, of the branchlets shorter.—*Fl. Antarct.* ii. t. 182. f. 4; *Harv. Ner. Austr.* 48; *J. Ag. Sp. Alg.* 923.

Stewart's Island, *Lyall*. (Falkland Islands.)

5. ***P. pennata***, *Agardh*;—*Fl. N. Z.* ii. 231. Frond 1–2 in. high, dark red, blackish when dry. Stem branched above the middle, setaceous, compressed; branches erecto-patent, simple or alternately decompound, all pinnated with distichous subulate erecto-patent branchlets; articulations as broad as long, with 8–10 tubes.—*J. Ag. Sp. Alg.* 928.

Auckland, *Lyall*; Cape Kidnapper, *Colenso*. (Australia, Atlantic and Mediterranean Seas.)

6. ***P. neglecta***, *Harv. in Trans. Irish Academy*, xxii. 541. Fronds forming dense tufts 1 in. diameter. Stems decumbent, rooting below; tips ascending, sparingly branched; branches ascending, then erect, sparingly divided, attenuated at the apex; articulations twice as long as broad, upper as long as broad. Tubes about 8–9.—*J. Ag. Sp. Alg.* 942.

New Zealand, *Sinclair*. (Australia.)

7. ***P. implexa***, *Hook. f. and Harv. Fl. N. Z.* ii. 229. Frond small, tufted, 1 in. high, purple. Stems creeping, intricate; branches alternate, spreading, divided at the apex; branchlets subulate, spreading, subsimple; lower articulations once and a half as long as broad, upper as long as broad. Tubes 4.—*J. Ag. Sp. Alg.* 946.



Akaroa, *Raoul*; Cape Kidnapper and Parimahu, *Colenso*.

8. **P. macra**, *Harv. in Fl. N. Z.* ii. 229. A small and imperfectly-known plant, forming matted patches on rocks, similar in many respects to *P. implexa*, but the branches are more simple; the articulations are similar and shorter.

Akaroa, *Raoul*; Hawke's Bay, on tidal rocks, *Colenso*.

9. **P. rudis**, *Hook. f. and Harv. Fl. N. Z.* ii. 229. Fronds small, 1-1½ in. long, densely tufted, dark-brown, rigid, obovate in outline. Stems erect from matted creeping filaments, slender, irregularly branched; branches erect, subfastigate, alternate; lower long, simple; upper pinnated above; pinnules erect, subulate, elongate; articulations pellucid at the nodes, of the branches 2-3 times longer than broad, of the branchlets 1½ times. Tubes 3-4. Tetraspores in one row in the swollen tips of the branches.—*Harv. Ner. Austr.* 44; *J. Ag. Sp. Alg.* 946.

Cook's Straits, *Lyall*; Akaroa, *Raoul*; **Lord Auckland's** group, *J. D. H.*

10. **P. dumosa**, *Hook. f. and Harv. Fl. Antarct.* 182. t. 75. f. 1. Fronds tufted, dark red-brown. Stems erect, rigid, 1-3 in. long, flabellately-branched; branches fastigate, simple or forked, clothed with very spreading squarrose multifid branchlets  $\frac{1}{12}$ - $\frac{1}{6}$  in. long; pinnules divaricate, subulate; articulations about as long as broad; cells about 5, lower coated with a band of smaller cells.—*Harv. Ner. Austr.* 42; *J. Ag. Sp. Alg.* 950.

Parasitic on larger *Algæ*, **Campbell's** Island, *J. D. H.*—*J. Agardh* suspects that this, which *Harvey* places near *P. Lyallii*, is better placed here.

11. **P. strictissima**, *Hook. f. and Harv. Fl. N. Z.* ii. 227. Fronds densely tufted, dark red, flaccid. Stems 4-6 in. long, setaceous and rigid below, capillary and excessively branched above; branches fastigate, lower spreading with obtuse axils, upper erect or appressed, with very acute axils; lower articulations about as long as broad, upper 5 times as long. Tubes 4.—*Harv. Ner. Austr.* 42; *J. Ag. Sp. Alg.* 962.

New Zealand, *Raoul*; Port Underwood, *Lyall*.

12. **P. amphibia**, *Harv. in Fl. N. Z.* ii. 229. Fronds in dense intricate red-brown tufts, 2-3 in. high. Stems capillary, rigid, much-branched, attenuated upwards, decompoundly-branched; branches and branchlets irregularly alternate; axils spreading; branchlets often multifid at the tips; articulation about twice as long as broad, upper much longer. Tubes 4. Tetraspores small.

Massacre Bay, in brackish water when covered at high tide by the sea, *Lyall*.—Allied to the European *P. urceolata*, which also inhabits brackish water.

13. **P. abscissa**, *Hook. f. and Harv. Fl. N. Z.* ii. 227. Fronds densely tufted, 3-6 in. high, bright-red. Stems capillary, flaccid, alternately decompound; smaller branches naked below, fastigately-branched and truncate at the top; tips naked or fibrilliferous; articulations of the branches much longer than broad, of the branchlets twice as long as broad. Tubes 4. Conceptacles ovoid-globose, stalked, often secund; tetraspores small.—*P.*

*abscissa* and *microcarpa*, Fl. Antarct. 479, 480. t. 182. f. 3; Harv. Ner. Austr. 42, 43; J. Ag. Sp. Alg. 974.

Cook's Straits to Stewart's Island, *Lyall*; Akaroa, *Raoul*. (Tasmania, Fuegia.)

14. **P. variabilis**, *Harv. in Fl. N. Z.* ii. 228. Fronds red-brown or purple, loosely tufted, flaccid, 2–4 in. high, setaceous, irregularly dichotomous below, variously branched above; branches naked or with multifid branchlets, or excessively divided; branchlets erect; articulations very variable in length, all short, the lower shorter than broad, and middle about twice as long, or all very much longer than broad; tubes 4, broad, spirally twisted. Conceptacles broadly ovoid, subsessile.—J. Ag. Sp. Alg. 975.

Common on the coasts, especially of the **Middle** Island, on shells, other seaweeds, etc., *Lyall*, etc.

15. **P. nana**, *Harv. in Fl. N. Z.* ii. 228. Very similar to the preceding, but much smaller, not 1 in. high, covered with ovoid conceptacles.

Auckland, on Corallines, *Lyall*.

16. **P. rhododactyla**, *Harv. in Fl. N. Z.* ii. 228. Fronds tall, stout, 8 in. long; articulate throughout, setaceous below, flaccid above, dichotomously branched; branches bright rose-red, forked, with spreading axils; branchlets dichotomously multifid, acute or acuminate, ultimate subsecund or fascicled, with narrow axils; lower articulations very short, coated with small cells; middle ones as long as broad; upper of the larger branchlets shorter than broad, of the upper extremely short; tubes 4, broad.

D'Urville Island, in five fathoms water, *Lyall*.

17. **P. brachygona**, *Harv. in Fl. N. Z.* ii. 228. Fronds tufted, rigid, purple, 3–4 in. high, setaceous, divided from the base into alternate decompound branches, which are again divided and taper to slender points, secondary and ultimate branches capillary, irregular, alternate, secund or subdichotomous; axils patent; lower articulations very short, coated with cells; middle ones  $1\frac{1}{2}$ –3 times as long as broad; upper very short; tubes 4.

Stewart's Island, *Lyall*.—Allied to the *P. Griffithsiana* of Europe.

18. **P. Brodiaei**?, *Greville*;—*Fl. N. Z.* ii. 230. Fronds tall, tufted, 10–18 in. high, lanceolate. Stem often as thick as a sparrow-quill below, simple, forked or alternately branched, or clothed with branchlets, 2 in. long, which are fascicled, multifid, pellucid; articulations  $1\frac{1}{2}$  times as long as broad, all coated with small cells; tubes 6–8; conceptacles urceolate-ovoid, sessile on the branches.—Harv. Phyc. Brit. t. 195; J. Ag. Sp. Alg. 993.

Apparently common from the East coast to Stewart's Island, *Lyall*. (N. Atlantic Ocean.)

19. **P. Lyallii**, *Hook. f. and Harv. Fl. N. Z.* ii. 230. Frond erect, 4–5 in. long, brownish-red, darker when dry, elongate, cartilaginous, setaceous, inarticulate, simple or divided below, branched throughout its length; branches simple, 4-farious, densely clothed with multifid, short, imbricate, dichotomous spreading branchlets  $\frac{1}{12}$ – $\frac{1}{8}$  in. long, ultimate subulate; articulations about as long as broad, visible on the branchlets only, coated with

small cells; tubes 4.—Fl. Antart. t. 74. f. 1; Harv. Ner. Austr. 42. *P. Maltardiæ*, Harvey in part (N. Z. specimens only).

Hawke's Bay and elsewhere, on the East coast, *Colenso*; Otago and Stewart's Island, *Lyall*, *Lindsay*. **Lord Auckland's** group, *J. D. H.*

20. **P. corymbifera**, *Agardh*;—*Fl. N. Z.* ii. 231. Fronds loosely or densely tufted, red-brown, 6–8 in. long, setaceous, attenuated, many-times dichotomous, striate; upper branches alternately divided, bearing at intervals short lateral alternate branchlets,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, which are obovate or corymbose in outline; branchlets dichotomous; articulations hyaline, of the main stem 2–3 times as long as broad, of the branches shorter, of the ultimate shorter than broad; tubes 10–14. Tetraspores in distorted branchlets.—Harv. Ner. Austr. 54; *J. Ag. Sp. Alg.* 1039.

Maketu, *Chapman*. (South Africa.)

21. **P. comoides**, *Harv. in Fl. N. Z.* ii. 231. Fronds densely tufted, red-brown, capillary, decomposundly branched from the very base; branches many-times alternately and dichotomously divided, the smaller naked at the base, alternately compound at the apex; middle articulations 4–5 times as long as broad; upper 2–3 times; uppermost  $1\frac{1}{2}$  times; nodes pellucid; tubes 9 or 10.

Banks's Peninsula, *Lyall*.

22. **P. isogona**, *Harv. in Fl. N. Z.* ii. 231. Very similar to *P. comoides*, and perhaps only a variety of it, but the filaments are more slender; articulations much shorter ( $1\frac{1}{2}$  times longer than broad).

Cape Kidnapper and Hawke's Bay, *Colenso*; Blind Bay, *Lyall*.

23. **P. australis**, *J. Agardh*.—*P. cladostephus*, *Mont.*;—*Fl. N. Z.* ii. 232. Frond 6–18 in. long, brown-purple, setaceous, articulate throughout, alternately excessively branched from the base; larger branches decomposund; smaller erect, elongate, simple, all clothed with whorled, imbricate, dichotomous, rose-red, 1-tubed branchlets, springing from every node; tips swollen; articulations of the branches 2–3 times as long as broad, with 7 tubes; upper shorter. Conceptacles ovate, sessile on branches at the base of the branchlets. Tetraspores on smaller branchlets.—*J. Ag. Sp. Alg.* 1044. *P. cladostephus*, *Mont. in Voy. au Pôle Sud*, t. 13. f. 4 a; *Fl. Antart.* 184; *Harv. Ner. Austr.* 45; *Phyc. Austr.* t. 154. *P. byssoclados*, *Harv. in Hook. Lond. Journ. Bot.* iii. 436. *Bindera cladostephus*, *Décaisne*. *Griffithsia australis*, *Agardh*.

Probably common, parasitical on *Fuci*, though found hitherto only south of Canterbury; Banks's Peninsula, *Lyall*, *Raoul*. **Lord Auckland's** group, *Hombrook*, etc. (Australia, Tasmania.)

24. **P. decipiens**, *Mont.*;—*Fl. N. Z.* ii. 230. Frond stout, shrubby, twiggy, coarse, bark brown, eventually black, bushy, grooved, pellucidly articulate, branched from the very base; branches erect, decomposund; lateral branches 4-farious, erecto-patent, attenuated upwards; ultimate spinescent, scattered; articulations so short that the branches appear transversely striated; tubes 7.—*Mont. in Voy. au Pôle Sud*, 131; *Fl. Antart.* 184; *Harv. Ner.*

Austr. 51; J. Ag. Sp. Alg. 1046. *R. rytiplœoides*, Hook. Lond. Journ. Bot. iv. 537.

Banks's Peninsula and Otago, *Raoul*, *Lyall*. **Lord Auckland's** group, *Hombron*, *J. D. H.*

25. **P. cancellata**, *Harv. in Fl. N. Z.* ii. 230. Frond 4-5 in. high, robust, shrubby, brownish-black, globose in outline. Stem as thick as pack-thread, terete, furrowed, excessively branched from the base; branches much divided alternately, spreading all round; branchlets tapering, much more slender, pinnate or 2-pinnate; ultimate spinescent; lower articulations 3 times, upper twice as broad as long; tubes 7-8. Conceptacles small, ovate, sessile.—*Harv. Ner. Austr.* 51. t. 15.

Banks's Peninsula, *Lyall*. (Tasmania, Australia.)

26. **P. aterrima**, *Hook. f. and Harv. Fl. N. Z.* ii. 230. Frond 4-5 in. high, black when dry, rather rigid. Stem setaceous, furrowed, articulate, naked below, decompoundly branched above, scarcely dichotomous, narrowed to the apex; branches attenuate or secund, obovate in outline; branchlets distant, erect, subulate; axils acute; articulations all very short; tubes 9-10, oblong, hexagonal. Conceptacles sessile, scattered, ovoid-globose, obtuse.—*Harv. Ner. Austr.* 52; *J. Ag. Sp. Alg.* 1050.

Parasitical on *Fuci*, abundant, *Colenso*, etc.

27. **P. ramulosa**, *Harv. in Fl. N. Z.* ii. 230. Frond 1 in. high, blackish, flabellately branched. Stem as thick as horsehair, divided from above the base into numerous alternate branches, which are erect, close-set; branchlets numerous, spreading, subulate, simple or again branched,  $\frac{1}{12}$ — $\frac{1}{6}$  in. long; tips all acute; articulations all about half as long as broad; tubes 7.

Parasitic on *Sargassa*; *Parimahu*, *Colenso*.

28. **P. nigrescens**, *Grev.*;—*Fl. N. Z.* ii. 231. Frond robust, bushy, 6 in. high, dark brown, rigid below. Stem setaceous, rough below with broken off branches, excessively branched above; branches flaccid, somewhat distichous, repeatedly pinnate, obovate in outline; pinnules elongate, distant, alternate, subulate, the upper again pinnate at their tips; lower articulations short; upper longer; tubes 16. Conceptacles ovoid, sessile.—*Harv. Ner. Austr.* 44; *Phyc. Brit.* t. 277; *J. Ag. Sp. Alg.* 1057.

**New Zealand**, *Raoul*. (Atlantic and Baltic Oceans.)

#### 40. **DASYA**, Agardh.

Frond red, filiform or compressed, dendroid; axis articulate, of many radiating cells surrounding a central cavity, the whole coated with still smaller cells; branchlets articulate, 1-tubed. Conceptacles ovate or urceolate, with pyriform spores. Stichidia lanceolate, on the branchlets, containing transverse rows of tetraspores.

Very beautiful bright red seaweeds, natives chiefly of the temperate zones.

1. **D. collabens**, *Hook. f. and Harv. Fl. N. Z.* ii. 222. Frond 1-12



in. high, soft and flaccid, terete, inarticulate, glabrous, decompoundly pinnate; pinnæ ovate-lanceolate, 2-3-pinnate; pinnules distichous, subdivided, clothed with articulate 1-tubed dichotomous branchlets, which are spreading, subulate, forked, contracted at the joints; articulations 2-3 times longer than broad.—Harv. Ner. Austr. 61. t. 21, young state only.

From Akaroa, *Raoul*, southwards.

2. **D. squarrosa**, *Harv. in Fl. N. Z.* ii. 232. Fronds crimson, gregarious, 1-2 in. high, distichous, pinnate. Stems articulate, with 7-8 tubes, pellucid, except at the base, rough below with horizontal hair-like branchlets, smooth above, 1-3-pinnate; branches alternate, on second or third node; branchlets 3-tubed below, 1-tubed above, short, divaricating, cylindric, obtuse, simple or forked; articulations of the branches as long as broad, of the ultimate longer.

Stewart's Island, Port William, *Lyall*.

3. **D. tessellata**, *Harv. in Fl. N. Z.* ii. 233. Frond densely tufted, crimson-lake. Stems 1-2 in. high, setaceous, pellucid, of about 12 cells around the central tube, tessellated with large, transverse, square or oblong cells, pinnate or 2-pinnate; branches spreading, penultimate pinnated, with alternate, distichous, very spreading, short, dichotomous or pectinate, secund branchlets, below 3-tubed; ultimate 1-tubed, subulate, acute or obtuse, divaricating, often changed into sessile stichidia.

Cook's Straits, Blind and Massacre Bays, *Lyall*.

4. **D. Berkeleyi**, *J. Agardh, Sp. Alg.* 1179.—*Polysiphonia punicea*, Mont. Fl. Antarct. i. 182. Frond red-purple, 4-8 in. long, setaceous, very irregularly branched, dichotomous or with a percurrent stem and pinnated branches, which are usually flexuose and zigzag, all furnished with short alternate or spirally disposed branchlets  $\frac{1}{2}$ - $\frac{1}{3}$  in. long; articulations of the branches 3 times longer than broad, of the branchlets as long as broad; tubes 8. Conceptacles ovoid, sessile; stichidia lanceolate.—*Polysiphonia punicea* and *Heterosiphonia Berkeleyi*, Mont. in Voy. au Pôle Sud, 137 and 128 t. 5. f. 1. and 3. *P. Berkeleyi*, Harv. Ner. Austr. 46.

**Lord Auckland's group**, *Hombron, J. D. H.* (Fuegia, Falkland Islands, Kerguelen's Land.)

#### 41. POLYZONIA, Suhr.

Frond parasitic, minute, rose-red, filiform, articulate, much distichously branched; branchlets leaf-like, alternate, flattened, angular, toothed or pectinate and secund. Stem of many parallel tubular cells. Conceptacles ovoid, enclosing pyriform spores. Stichidia lanceolate, pedicelled, supra-axillary, often crested, containing one row of large tetraspores.

Most lovely little *Algæ*, always parasitic on the stems of larger ones, growing in deep water, found only in the S. temperate and Antarctic zones.

1. **P. cuneifolia**, *Montagne*;—*Fl. N. Z.* ii. 226. Fronds creeping by a filiform rhizome, articulate. Stems erect, 4-5 in. long, undivided, furnished

with long, simple (rarely branched), alternate branches, everywhere covered with distichous, alternate leaflets (branchlets); leaflets vertical, trapezoid, truncate, irregularly cut and toothed, sometimes 2-fid; lower margin entire. Conceptacle sessile on the basal lobe of a deeply cut leaflet. Stichidia supra-axillary, crested with processes, at first simple, then pinnately branched.—Harv. Ner. Austr. 70.

Roots and fronds of large *Algæ*, Otago, Stewart's Island, and Port Preservation, *Lyall*. **Lord Auckland's** group and **Campbell's** Island: abundant, *J. D. H.*

2. **P. adiantiformis**, *Decaisne*;—*Fl. N. Z.* ii. 226. Minute, vaguely branched; branches spreading; leaflets as in *P. cuneifolia*, but smaller and with much smaller cells.

Parasitic on *Marginaria*. Described by Dr. Harvey from very immature scraps.

3. **P. ovalifolia**, *Hook. f. and Harv. Fl. N. Z.* 226. t. 112 B. Habit of *P. cuneifolia*; leaflets horizontal, sessile, obliquely oblong, very obtuse, quite entire or toothed.

Parasitic on *Amphiroa corymbosa*, *Colenso*. Specimens immature.

4. **P. bipartita**, *Hook. f. and Harv. Fl. N. Z.* ii. 227. t. 112 A. Minute; leaflets distichous, alternate, 2-partite; segments flattened, linear, mucronate or obtuse; upper erect, of 3 rows of rectangular cells; lower shorter, horizontal. Stichidia large, axillary, linear-oblong, apiculate, with one row of few large tetraspores.

On *Carpophyllum maschalocarpus*, *Colenso*.—Very similar in general appearance to *Polysiphonia ceratoclada*.

5. **P. Harveyana**, *Decaisne*;—*Fl. N. Z.* ii. 227. Stems  $\frac{1}{2}$ –2 in. high, slender or robust, compressed, closely set with alternate distichous, pectinate, horizontal and recurved leaflets. Stichidia supra-axillary, simple or 2–3-lobed; lobes crested.—*P. Colensoi* and *P. Harveyi*, Harv. Ner. Austr. 71 and 72.

Common, parasitical on various *Algæ*, *J. D. H.*, etc.

#### 42. **CHAMPIA**, Desvaux.

Frond dull reddish, terete or compressed, branched, tubular, constricted at intervals, internally septate at the constrictions, the septa connected by longitudinal jointed filaments; walls of one or many rows of minute coloured polygonal cells. Conceptacles ovate-ovoid, with a terminal pore, containing a tuft of branched filaments; the branches terminated by ovoid or obconic spores. Tetraspores 3-partite, scattered in the walls of the stem and branches.

1. **C. novæ-Zelandiæ**, *Harv. Fl. N. Z.* ii. 235. Frond 3 in. long, stipitate. Stem  $\frac{1}{12}$  in. broad, compressed, subattenuate at the apex; branches opposite or whorled, simple or divided; branchlets often opposite; articulations twice as broad as long, obtuse. Conceptacles conical, ovoid, sessile. Tetraspores scattered through the branches.—*Chylocladia*, Harv. Ner. Aust. 80. *Lomentaria*, *J. Ag. Sp. Alg.* ii. 739.

Common along the whole coast, *Lyall*, etc.

2. **C. affinis**, *Harv. in Fl. N. Z.* ii. 237. Frond 12 in. and upwards. Stem undivided, obscurely constricted at intervals, clothed throughout with opposite alternate and whorled spreading branches; branches elongate, shorter upwards, tapering at both ends, constricted at regular intervals; branchlets disposed like the branches, sometimes again branching; articulations of the branchlets moniliform, shorter than broad. Conceptacles large, conical.—*Chylocladia*, *Harv. Ner. Austr.* 79. t. 29. *C. Kaliformis*, *Harv. in Hook. Lond. Journ. Bot.* iii. 444, excl. synonyms. *Lomentaria*, *J. Ag. Sp. Alg.* ii. 730.

Stewart's Island, *Lyall*. (Australia, Tasmania.)

3. **C. parvula**, *Harv. in Fl. N. Z.* ii. 236. Fronds densely tufted, 2–4 in. high, bushy, irregularly branched, stemless, flexuous, irregularly branched; branches and branchlets scattered, spreading; articulations of the branches as long or twice as long as broad, sometimes moniliform. Conceptacles large, ovoid.—*Chylocladia*, *Grev.*; *Harv. Ner. Austr.* 80; *Phyc. Brit.* t. 210. *Lomentaria*, *Gaill.*; *J. Ag. Sp. Alg.* 729.

Akaroa, *D'Urville*, *Raoul*. (Atlantic and Mediterranean seas.)

*C. obsoleta* is mentioned in Harvey's 'Phycologia Australis,' synops. p. 5, as a native of New Zealand, but I do not know on what authority.

#### 43. LAURENCIA, Lamouroux.

Frond red or purple, often fading to green, cartilaginous, cylindric or compressed, linear, pinnate; tips obtuse; structure cellular, solid; cells in 2 series; inner oblong, angular; outer smaller. Conceptacles enclosing tufted spores. Tetraspores 3-parted, imbedded in the branchlets.

A widely diffused genus, especially in the temperate zones.

\* *Frond compressed.*

1. **L. elata**, *Harv.*;—*Fl. N. Z.* ii. 233. Frond 12–18 in. high, blood-red, compressed or flat, repeatedly pinnate; branches  $\frac{1}{2}$  in. diameter, compressed, erecto-patent; lower pinnæ longest, all alternate; ultimate linear-clongate. Conceptacles terminal.—*Harv. Ner. Austr.* 81. t. 33; *J. Ag. Sp. Alg.* ii. 766.

East coast, *Colenso*. (Australia, Tasmania.)—Very nearly allied to the common *L. pinnatifida*.

2. **L. pinnatifida**, *Lamour. Fl. Antarct.* 184.—Very similar to *L. elata*, but frond broader, more purple, less branched, and the conceptacles are lateral.—*Harv. Phyc. Brit.* t. 55; *Fl. Antarct.*

**Lord Auckland's group**, *J. D. H.* (South Africa, Fuegia, abundant in the north temperate ocean.)

3. **L. botrychioides**, *Harv. in Fl. N. Z.* ii. 234. Frond tufted, small, purplish-brown, erect, 1–3 in. high, rising from creeping matted surculi; rhachis or stem closely pinnatifid, dilated upwards, compressed; branches  $\frac{1}{16}$ – $\frac{1}{12}$  in. broad, 3–4-pinnate; pinnæ distichous, usually opposite; lower

larger; pinnules very short, cuneate or clavate, crenate, or multifid with the lobes turbinate. Tetraspores in the club-shaped tips of the pinnules.—*L. botryioides*, Harv. Ner. Austr. 82, in part.

Bay of Islands, *J. D. H.*; Parimahu, *Colenso*.

4. ***L. distichophylla*?** *J. Ag. Sp. Alg.* ii. 762;—*Fl. N. Z.* ii. 234. Frond 2–3 in. high, crimson rose-red or purple, densely tufted, compressed, distichously decomposed, rarely more simple, ovate in outline; rachis straight, dilated upwards; pinnæ usually opposite, spreading, flat; pinnules cylindric, obtuse, simple or again divided. Conceptacles sessile on the branches of the pinnules, ovoid-urceolate, acuminate. Tetraspores fasciate below the tips of ultimate pinnules.

Bay of Islands, *J. D. H.*; East coast, *Colenso*; Watemata, *Lyll*.—Apparently the same as *J. Agardh*'s plant, of which the locality is unknown.

\*\* *Frond terete; branchlets cylindric, narrowed at the base.*

5. ***L. cæspitosa***, *Lamour.*;—*Fl. Antarct.* i. 184. Very similar to *L. pinnatifida*, and usually regarded as a variety of that plant, but darker-coloured and more terete.—Harv. Ner. Austr. 82.

**Lord Auckland's group**, *J. D. H.* (Chili, Falkland, Atlantic.)

6. ***L. gracilis***, *Hook. f. and Harv. Fl. N. Z.* ii. 234. Frond tall, very slender, filiform, setaceous, flexuous, excessively and pinnately branched; branches elongate, alternate, simple or again branched; branchlets alternate, horizontal and secund, short or long, cylindric, capitate,  $\frac{1}{12}$ – $\frac{3}{4}$  in. long.—Harv. Ner. Austr. 84; *J. Ag. Sp. Alg.* ii. 746.

Hawke's Bay, *Colenso*.

7. ***L. papillosa***, *Grev.*;—*Fl. N. Z.* ii. 234. Frond dark purple, fading to green, densely tufted, 4–6 in. high, 2-pinnate, terete; pinnæ close-set, elongate, simple, opposite and alternate, studded with spreading, simple or cleft, obtuse, warted pinnules, which are  $\frac{1}{12}$ – $\frac{1}{4}$  in. long and depressed or perforated at the apex.—Harv. Ner. Austr. 84; *J. Ag. Sp. Alg.* ii. 756. *Fucus thyrsoïdes*, *Turn. Hist. Fuc. t.* 19.

**New Zealand**, *Banks and Solander.* (Atlantic, Pacific, and Indian Oceans.)

8. ***L. Forsteri***, *Grev.*;—*Fl. N. Z.* ii. 234. Frond pink, fading to orange, terete, filiform, nearly equal throughout, much dichotomously and pinnately branched; branches somewhat fastigiate, the smaller spreading and subdichotomous; branchlets spreading, cylindric, dichotomous, alternate or secund.—Harv. Ner. Austr. 85; *J. Ag. Sp. Alg.* ii. 744. *Fucus*, *Turn. Hist. Fuc. t.* 77.

**New Zealand**, *Forster.* (Australia and Tasmania.)

9. ***L. virgata***, *J. Ag. Sp. Alg.* ii. 752;—*Fl. N. Z.* ii. 234. Frond 6–12 in. high, red-purple, about as stout as a pigeon's quill, pyramidal in outline, terete, pinnately branched in all directions; lower branches 4–5 in. long, elongate, racemose, and branchlets more or less regularly opposite and whorled. Conceptacles crowded, spherico-ovoid.



East coast, *Colenso* ; Houraki Gulf, Banks's Peninsula, and Otago, *Lyll*. (S. Africa, California.)

#### 44. CHONDRIA, Agardh.

Frond dull red or purplish, filiform, cartilaginous, dichotomously or verticillately branched, opaque ; axis articulated, of many parallel tubes, coated with small polygonal irregularly placed cells ; branchlets clavate, constricted at the insertions. Conceptacles ovoid, containing pyriform stalked spores. Tetraspores 3-parted, scattered on the ramuli.

A genus of several species, scattered through the temperate and tropical oceans.

1. **C. macrocarpa**, *Harv. in Fl. N. Z.* ii. 223. Frond 4-6 in. long, as thick as a sparrow's quill, cylindric, alternately or pinnately decomposed ; branches distichous, close or distant, alternate or secund, closely set with alternate pinnae or curved and distantly compound ; branchlets elongate,  $\frac{1}{2}$ -1 in. long, very obtuse, slightly constricted at the base. Conceptacles large, ovoid at the ends or sessile on the sides of the branchlets.

Foveaux Straits, *Lyll* ; Otago, *Lindsay*.

2. **C. flagellaris**, *Harv. in Fl. N. Z.* ii. 224. Fronds dull purple, cartilaginous, setaceous, densely tufted, branched vaguely from the base or alternately decomposed ; branches elongate, simple, with few lateral, rather spreading branches ; branchlets scattered, unequal, filiform, acute, not constricted at the base. Conceptacles large, ovoid, sessile, with a prominent orifice.

Port Nicholson and Paterson's Harbour, *Lyll*.

#### 45. CLADHYMENIA, Harvey.

Frond rose-pink, membranous, flat, thin, with or without a midrib, distichously pinnatifid ; structure of 2 strata, internal cells large, polygonal, full of granules, outer minute, coloured. Conceptacles ovoid, enclosing a tuft of pyriform spores. Tetraspores 3-partite, in definite marginal sori.

Genus confined to New Zealand and Australia.

1. **C. Lyallii**, *Hook. f. and Harv. Fl. N. Z.* ii. 235. Frond rose-red, 4-5 in. high, broadly deltoid in outline, filiform at the base, soon dilating to  $\frac{1}{10}$ - $\frac{1}{6}$  in., then flattened, traversed by an obscure nerve, attenuated to the apex, between gelatinous and membranous, 2-3-pinnatifid ; branches spreading, linear-lanceolate ; lowest 2-pinnatifid ; middle pinnatifid ; upper entire or toothed ; branchlets linear, filiform, obtuse. Conceptacles stalked, elliptic-oblong.—*Harv. Ner. Austr.* 87. t. 33.

Bay of Islands, *Lyll*.

2. **C. oblongifolia**, *Harv. in Fl. N. Z.* ii. 235. t. 113. Frond red, brown when dry, 1 foot long and more, nearly 1 in. broad, flat, gelatinously membranous, pinnate or 2-pinnate ; pinnae 6-8 in. long, tapering downwards, obtuse, simple or bearing similar pinnules ; margins more or less fringed with filiform or compressed, simple or branched processes. Conceptacles sessile

on the terete processes, ovoid. Tetraspores sunk in flattened processes.—Harv. Ner. Austr. 87; J. Ag. Sp. Alg. ii. 771.

East coast, *Colenso*; Paroah Bay and Port Cooper, *Lyall*.—Very similar to, and easily mistaken for *Callophyllis Hombroniana*.

#### 46. ASPARAGOPSIS, Montagne.

Frond filiform, red, inarticulate, panicle; branches thyrsoïd, penicillate, pinnately decompose; branchlets setaceous, cellular. Conceptacles ovoid, enclosing a dense tuft of pyriform spores covered with a membrane. Tetraspores unknown.

Natives of the Mediterranean and warmer seas.

1. *A. armata*, Harv.—*A. Delilei*, Fl. N. Z. ii. 233. Rhizome branched, setaceous. Fronds pale or bright rose-red, tufted, 6–12 in. long, much branched; branches linear-lanceolate in outline, virgate, clothed to the base with short setaceous branchlets, and having also at the base a few long, naked, retrorsely spinous, stiff, spreading branches. Conceptacles globose, on cylindrical stalks.—Harv. Phyc. Austr. iv. t. 122. *A. Delilei*, Harv. Ner. Austr. t. 35, not of Montagne.

In deep water, Cook's Straits, *Lyall*. (Australia and Tasmania.)

#### 47. DELISEA, Lamouroux.

Frond bright red, cartilaginous, narrow, compressed, 2-edged, much branched alternately; branches distichous, pectinate or coarsely serrate; midrib evident, immersed; structure an axis of roundish-angular, colourless, close-packed cells, surrounded by several series of coloured, minute, cortical cells. Conceptacles ovoid, sessile on the midrib towards the tips of the branchlets, and enclosing a tuft of pyriform spores. Tetraspores immersed in wart-like swellings, spread over the tips of the branches.

A southern genus, found hitherto only in Australia, New Zealand, South Africa, and Kerguelen's Land.

1. *D. elegans*, Lamour.;—Fl. N. Z. ii. 233. Frond bright red, 6–12 in. long, excessively and finely branched, compressed, membranous, narrow, pinnately decompose, all the branches and their divisions bordered with distichous, subulate, acute, alternate branchlets. Conceptacles solitary or 2 together, sessile in the axils of the subulate branchlets, opening by a pore.—Harv. Ner. Austr. 89. t. 34; J. Ag. Sp. Alg. ii. 781.

Preservation Harbour and Akaroa, *Lyall*. (Australia and Tasmania.)

#### 48. PTILONIA, J. Agardh.

Frond bright rose-purple, linear, membranous above, flattened and 2-edged, decompose-pinnate, toothed, with a sunk midrib of 3 series of cells; axis of branched, jointed, longitudinal threads, running laterally into an interme-

diate tissue of rounded-angular cells; cortical cells rounded, minute. Conceptacles subterminal on the pinnules.

A genus of a single most beautiful species.

1. **P. magellanica**, *J. Ag. Sp. Alg.* ii. 774;—*Fl. N. Z.* ii. 235. Root scutate. Frond 2–10 in. long,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad, membranous above, cartilaginous below; pinnæ alternate or subopposite in pairs, terminal flattened, toothed; teeth growing out into linear pinnæ; axils rounded.—*Plocamium*, Hook. f. and Harv. *Fl. Antart.*; Harv. *Ner. Austr.* 124. *Thamnophora*, Mont. in *Voy. au Pôle Sud*, t. 8. f. 2.

East coast, *Lyall*. (Abundant in Fuegia and Kerguelen's Land.)

#### 49. AMPHIROA, Lamouroux.

Frond pale-red, flat, compressed or terete, articulate, dichotomously branched or pinnate or whorled; articulations cartilaginous, coated with calcareous matter. Conceptacles conical, wart-like, opening by a pore, enclosing a tuft of erect pyriform, at length 4-parted spore-threads.

Handsome Corallines, usually found in tide-pools in both temperate, but chiefly tropical seas.

1. **A. corymbosa**, *Decaisne*;—*Fl. N. Z.* ii. 237. Frond 4–5 in. high, densely tufted, 2-pinnate at the top; pinnæ and pinnules close-set; lower articulations cylindric, very short; intermediate and upper deltoid or obcordate, compressed; lateral angles acute or produced, of the branches subsagittate; terminal lanceolate.—Harv. *Ner. Austr.* 99. t. 38; *J. Ag. Sp. Alg.* ii. 550.

East coast, *Colenso*; Bay of Islands, *Lyall*, etc. (S. Africa.)

2. **A. elegans**, *Hook. f. and Harv. Fl. N. Z.* ii. 237. Frond 2–3 in. long, slender, irregularly dichotomous; forks distant; lower articulations terete, three times as long as broad; middle and upper sagittate, with acute, subulate, erecto-patent, obtuse lobes. Conceptacles sunk in the lobes of the articulations.—Harv. *Ner. Austr.* 101. t. 38; *J. Ag. Sp. Alg.* ii. 546.

Cape Kidnapper, *Colenso*. (Tasmania.)

#### 50. CORALLINA, Linnæus.

Frond pale pink, filiform, jointed, usually pinnately branched; articulations coated with a calcareous deposit. Conceptacles ovoid-turbinate or obovate, opening by a pore, containing a tuft of erect pyriform or clavate transversely-parted tetraspores.

Small tufted perennial calcareous *Algæ*, known as Corallines, and growing in all seas.

1. **C. armata**, *Hook. f. and Harv. Fl. N. Z.* ii. 237. Frond dull purple, short, stout, 1–2 in. high, simple below, flabellately branched at the summit; branches 2-pinnate, fastigiata; articulations of the stem short, crowned with spines, middle broadly obcuneate, compressed, short, with 2–6-

whorled species; upper cuneate, uppermost terete, slender, obtuse, often capitate.—Harv. Ner. Austr. 100. t. 40; J. Ag. Sp. Alg. ii. 566.

East coast, *Colenso*.

2. **C. officinalis**, *Linn.*;—*Fl. N. Z.* ii. 237. Frond pink, pinnate or 2-pinnate; lower articulations cylindric, twice as long as broad, upper obconic, compressed.—Harv. Ner. Austr. 104; Phyc. Brit. t. 222; J. Ag. Sp. Alg. ii. 562.

Auckland, *Lyall*; East coast, *Colenso*. (Common in all seas.)

## 51. JANIA, Lamouroux.

Frond pale pink, subterete, filiform, articulated, dichotomously and flabellately branched; articulations coated with calcareous matter, cylindric or compressed. Conceptacles urn-shaped, in the forks of the upper branches, 2-4-horned, with a terminal pore, containing a tuft of at length transversely 4-parted spore-threads.

A common genus in both the temperate and tropical zones.

### § 1. *Frond pinnately compound.*

1. **J. Cuvieri**, *Decaisne*;—*Fl. N. Z.* ii. 237. Frond 2-4 in. long, plumose, pinnately compound; pinnae and pinnules slender, close-set pinnules simple or forked; articulations of the branches  $1\frac{1}{2}$ -2 times as long as broad, broadly obcuneate with prominent angles of the branchlets linear, 2-3 times as long as broad. Conceptacles terminal, urceolate, with slender processes.—Harv. Ner. Austr. 105. *Corallina*, J. Ag. Sp. Alg. ii. 572.

Common on the coasts, *Colenso*, etc. (Australia, Tasmania, S. Africa.)

2. **J. Hombronii**, *Mont.*;—*Fl. Antart.* 184. Frond excessively 3-pinnately branched; pinnae crowded, flabellate; lower articulations terete, upper obcuneate, truncate, as broad as long, compressed, of the branches terete, filiform, 2-3 times as long as broad, or ovate-globose, and bearing conceptacles.—Mont. in Voy. au Pôle Sud, 146; Harv. Ner. Austr. 105. *Corallina*, J. Ag. Sp. Alg. ii. 574.

**Lord Auckland's** group, *Hombron*, *J. D. H.*

3. **J. pistillaris**, *Mont.*;—*Fl. N. Z.* ii. 237. Frond tufted, laxly 2-pinnate; pinnae and pinnules remote, erecto-patent; lower articulations compressed, oblong-quadrate, dilated above, twice as long as broad, of the pinnules terete, discoid, or thickened at the tip and bearing tetraspores.—Mont. in Voy. au Pôle Sud, 147; Harv. Ner. Austr. 105. *Corallina*, J. Ag. Sp. Alg. ii. 574.

Bay of Islands, in holes of rocks, *Hombron*.—Description from Montagne.

### § 2. *Frond dichotomous, often fastigiate.*

4. **J. micrarthrodia**, *Lamour.*;—*Fl. N. Z.* ii. 237. Frond  $1\frac{1}{2}$ -2 in. high, tufted, slender, laxly dichotomously branched; axils patent; branches subarcuate; articulations all about the same proportionate length to breadth, as long or twice as long as broad, those of the stems cylindric, of the branches



subcylindric.—Harv. Ner. Austr. 107 ; J. Ag. Sp. Alg. ii. 555. *J. tenuissima*, Sond. ; Harv. l. c. 106. t. 40.

Probably common, East coast, *Colenso* ; Port Cooper, *Lyall*. (Australia.)

5. ***J. novæ-Zelandiæ***, *Harv. in Fl. N. Z.* ii. 237. Frond 1–2 in. long, setaceous, dichotomously branched ; axils acute ; articulations cylindric, 6–12 times longer than broad. Conceptacles urceolate, axillary, crowned with geminate 2–3-articulate filaments,

East coast, *Colenso* ; Banks's Peninsula, *Lyall*.

*J. gracilis*, Lamour., a little-known plant, referred by J. Agardh to *J. Cuvieri*, is stated by Montagne to have been found by Hombron at Akaroa.

## 52. MELOBESIA, Lamour.

Frond crustaceous, red pink or whitish, free or attached by its surface, never jointed, coated with a calcareous deposit, flattened, orbicular and lobed, or cylindric and branched. Conceptacles scattered, conical, sessile, containing a tuft of transversely-parted oblong tetraspores.

Perennial coral-like *Algæ*, found in all seas, sometimes forming calcareous incrustations on other *Algæ*, shells, and pebbles, etc., at others erect or foliated.

1. ***M. calcarea***, *Harv. Fl. N. Z.* ii. 238. Frond shrubby, 2–3 in. high, white, subdichotomous ; branches as broad as long,  $\frac{1}{12}$ – $\frac{1}{8}$  in. broad, distant, lower coalescing, upper free and narrow at the bases.—Harv. Phyc. Brit. t. 291 ; Ner. Austr. 110. *Lithobiu*, J. Ag. Sp. Alg. ii. 523.

Bay of Islands, *J. D. H.* (N. Atlantic, Mediterranean Sea, Galapagos Islands.)

2. ***M. Patena***, *Hook. f. and Harv. Fl. N. Z.* ii. 238. Frond horizontal, fixed to the stems of *Algæ*, and by a groove at the base, white red or purplish,  $\frac{1}{2}$  in. diameter, thick, flat, concave or undulate, obovate or suborbicular, quite entire, imbricate, concentrically striate, shining. Conceptacles numerous, scattered, depressed.—Harv. Ner. Austr. 111. t. 40.

Parasitic on *Ballia*, *Colenso*. (Tasmania, S. Africa.)

3. ***M. antarctica***, *Hook. f. and Harv. in Harv. Ner. Austr.* 111. Frond flat, suborbicular, attached by the lower surface ; margins free, quite entire, forming a thin expanded irregularly-lobed crust, pale, surface concentrically undulate. Conceptacles minute, depressed, hemispherical.—J. Ag. Sp. Alg. ii. 514. *M. verrucata*, var. *antarctica*, Fl. Antarct. 482.

Lord Auckland's group, *J. D. H.* (Tasmania, Fuegia, Kerguelen's Land.)

## 53. DELESSERIA, Agardh.

Frond bright rose-red, leaf-like, simple, dichotomously pinnately or proliferously branched, very membranous, flaccid ; midrib evident, substance of one layer of angular cells. Conceptacles hemispherical, on the ribs or nerves, enclosing a tuft of branched filaments bearing spores, which are seated on an elevated tubercle on the floor of the cavity. Tetraspores clustered in sori in the substance of the frond.

A most beautiful genus, common in both temperate zones.

§ 1. *Frond dichotomously branched.*

1. **D. Hookeri**, *Lyall in Fl. N. Z. ii. 238. t. 114, 115.* Frond 2 ft. and more long, stipitate, 4–5 in. broad, linear or ovate-lanceolate, or oblong-obovate, lacerate, acute or subacute, crimson-purple, sometimes palmatifid; substance thick, surface-cells small; costa stout, pinnated at distances of  $\frac{1}{2}$  in.; nerves thick, erecto-patent, dichotomous; margin erose-toothed. Conceptacles on obovate processes,  $\frac{1}{2}$ – $\frac{1}{6}$  in. long on the veins; walls thick; orifice prominent. Tetraspores in oblong minute sori near the base of the lamina.

Lyall's Bay or Cook's Straits, Foveaux Straits and Otago, *Lyall*.—The finest species of the genus.

2. **D. dichotoma**, *Hook. f. and Harv. Fl. N. Z. ii. 239.* Frond membranous, rose-purple or blood-red, 4–8 in. high, stipitate; stipes 2–3 in. long, oblong-cuneate or elliptic-lanceolate, obtuse or emarginate, at length 2-fid or lacinate; costa stout, dichotomous, vanishing below the apex. Sori rounded.—*Fl. Antart. 185. t. 71. f. 2*; *Harv. Ner. Austr. 115*; *J. Ag. Sp. Alg. ii. 682.*

Ruapuke and Chalky Bay, *Lyall.* **Lord Auckland's** group and **Campbell's** Island, *J. D. H.*

3. **D. pleurospora**, *Harv. in Fl. N. Z. ii. 239.* Frond 6–8 in. high, stipitate, flabellate, lacinate; segments dichotomous, cuneate, alternate, acute or subobtuse, spreading; margin quite entire; costa dichotomous, vanishing below the tips of the segments. Sori linear, arranged in confluent lines on each side of the costa.

Preservation Harbour, *Lyall*.—Possibly a form of *D. dichotoma*, but the sori appear very different.

4. **D. Leprieurii**, *Mont. ;—Fl. N. Z. ii. 240.* Fronds rising from a creeping rhizome, dichotomous or subfastigiate, dull violet-purple, 1–3 in. long, costate, constricted at the axils as if articulate; segments linear-lanceolate, acute at both ends. Tetraspores in lines radiating from the costa to the margin, on the terminal segments and on axillary leaflets.—*Montagne in Ann. Sc. Nat. ser. 3. xiii. 196. t. 5. f. 1*; *J. Ag. Sp. Alg. ii. 682.*

Bay of Islands, *J. D. H.* (Guiana, U. States).—A very curious plant, doubtfully referred to *Delesseria* by Harvey, more confidently by J. Agardh.

§ 2. *Frond pinnately decomposed; segments of the primary first pinnatifid and then pinnate.*

5. **D. quercifolia**, *Bory ;—Fl. N. Z. ii. 239.* Frond pale red-purple, 3–6 in. long, broadly ovate, pinnatifid and 2-pinnatifid, irregularly lobed, sinuate and toothed; costa stout, giving off opposite nerves to the tips of the lobes. Sori minute, punctiform, very numerous between the nerves on the lobes.—*Bory in Duperr. Voy. Bot. 186. t. 18. f. 1*; *Harv. Ner. Austr. 114. t. 46*; *J. Ag. Sp. Alg. ii. 692.*

East coast, lat. 42°, *Lyall.* (Fuegia, Falkland Islands.)

6. **D. Davisii**, *Hook. f. and Harv. Fl. N. Z. ii. 239.* Frond with a winged cartilaginous stipes, 5–7 in. long, rose-red, membranous, pinnate or pinnatifid; segments obliquely lanceolate, costate, feather-nerved, nerves

alternate, at length lacerate between the nerves, the ultimate segments erecto-patent, costate.—Fl. Antarct. 470. t. 175; Harv. Ner. Austr. 115; J. Ag. Sp. Alg. ii. 689.

Ruapuke, Preservation Harbour, and Chalky Bay, *Lyall*. (Fuegia.)

§ 3. *Frond proliferous, the branches rising from the midrib.*

7. **D. nereifolia**, *Harv. in Fl. N. Z. ii. 238*. Frond red-purple, stiff and elastic when fresh, when old with a stout stipes, 6–8 in. long, 1 in. broad, linear-oblong, obtuse, costate, pinnately veined; branches or leaflets springing from the often denuded stout costa, oblong, quite entire, flat, obtuse, with broad prominent midribs, and feathered with opposite close-set nerves, between which the membrane is reticulated with articulate lines of cells. Fruit unknown.

Preservation Harbour and Stewart's Island, *Lyall*.

8. **D. oppositifolia**, *Harv. in Fl. N. Z. ii. 239*. Frond lake-red, 1–2 in. high, linear-lanceolate, costate, at length 2–3-pinnately compound, with opposite leaflets springing from the costa; larger leaflets with a cylindric costa coated with small cells; smaller leaflets with an articulate costa.

Stewart's Island, rare, *Lyall*.

9. **D. crassinervia**, *Mont. ;—Fl. N. Z. ii. 239*. Frond bright red, linear, 1–2 ft. long, more or less closely pinnated throughout with branches 6–8 in. long; branches emitting leaflets from the midrib, which again are proliferously divided; costa very thick; leaflets ovate-lanceolate, acuminate at both ends. Sori elongate, solitary on each side of the midrib.—*Mont. in Voy. au Pôle Sud, 164. t. 8. f. 1* (small state); *Fl. Antarct. 184*; *Harv. Ner. Austr. 115*; *J. Ag. Sp. Alg. ii. 694*.

Ruapuke Harbour and Stewart's Island, *Lyall*. **Lord Auckland's** group and **Campbell's** Island, *J. D. H.* (Fuegia, Kerguelen's Land.)—Perhaps only a large southern state of the European *D. Hypoglossum*.

10. **D. ruscifolia**, *Lamour. ;—Fl. N. Z. ii. 239*. Frond crimson, 1–3 in. high, with a branched winged stem, linear-oblong, branched throughout proliferously from the costa; leaflets stipitate, young obovate, old linear, obtuse; costa pinnately veined; nerves pellucid when dry. Sori linear, 2 pairs on each side of the costa.—*Harv. Ner. Austr. 115*; *Phyc. Brit. t. 26*; *J. Ag. Sp. Alg. ii. 695*.

Cook's Straits, *Lyall*. (Australia, Fuegia, S. Africa, N. Atlantic.)

#### 54. **HEMINEURA**, *Harv.*

Frond rose-red, leaf-like, delicately membranous, flaccid, 1–3-pinnatifid, entire or serrulate; midrib very slender. Conceptacles horned, pierced by a pore on the costa. Tetraspores intramarginal.

Genus of two species, one Tasmanian and the following.

1. **H. cruenta**, *Harv. in Fl. N. Z. ii. 240*. Fronds 4–5 in. long,  $\frac{1}{2}$ –1 in. broad; segments narrow, ultimate  $\frac{1}{2}$  in. broad, acute, quite entire, but

crisped and waved; costa running through the principal part of the frond, not branching to the lobes, which have isolated costæ of their own; principal costa emitting numerous minute lanceolate leaflets.

Massacre Bay, *Lyall*.

## 55. NITOPHALLUM, Greville.

Characters of *Delesseria*, but no midrib, or an obscure one confined to the base of the frond.

A genus of most beautiful *Algæ*, which are abundant in the colder zones, and arrive at their greatest stature and beauty in the deep southern bays.

### § 1. *Sori subsolitary below the apices of the segments.*

1. **N. minus**, *Sond.*;—*Fl. N. Z.* ii. 119. Frond small, tufted, sessile, excessively delicate, 1–2 in. long, bright rose-red, linear, dichotomously pinnate from the base, quite entire, traversed by a few very slender longitudinal veins; branches divaricate, short, obtuse, upper dichotomous, multifid, ultimate obtuse. Sori towards the tips of the segments.—*Harv. Ner. Austr.* 119. *Cryptopleura*, *J. Ag. Sp. Alg.* ii. 655.

Parasitic, East coast, *Colenso*; Tauranga, *Davies*. (Australia.)

2. **N. uncinatum**, *J. Ag.?*;—*Fl. N. Z.* ii. 241. Fronds small, tufted, on a creeping rhizome, delicately membranous, sessile, 1–2 in. long, subpinnately dichotomous from the base, wholly veinless; segments linear,  $\frac{1}{10}$ – $\frac{1}{8}$  in. broad, upper acuminate, often secund; fruiting ones shorter, often 3-foliate. Sori solitary towards the tips of the segments.—*J. Ag. Sp. Alg.* ii. 654.

Blind Bay, Cook's Straits, *Lyall*. (Europe.)—Not found in fruit, and hence doubtful.

### § 2. *Sori more or less intramarginal.*

3. **N. palmatum**, *Harv. in Fl. N. Z.* ii. 240. Frond red-brown, thickish, 6–8 in. long and more, broadly cuneate at the base, and then narrowed into a thickened but not costate stipes 1–2 in. long, above palmately divided into many cuneate erect segments with narrow axils; costa 0, but whole frond traversed with microscopic veinlets; larger segments cuneate, dichotomously palmate, smaller oblong, obtuse, quite entire. Sori oblong, often elongate, usually in interrupted lines towards the apex, but continued downwards within the margin, often irregularly scattered.

Eastern coasts, *Colenso* and *Lyall*, apparently common.—The ordinary form strongly resembles *Rhodymenia palmata*, but Harvey enumerates many varieties, some crisped, some rose-red, some with pinnatifid lobes, and some with proliferous margins.

### § 3. *Sori scattered over the whole surface of the frond or its segments.*

† *Frond nerveless.*

4. **N. punctatum?**, *Grev.*;—*Fl. Antarct.* 185. Frond subsessile, delicately membranous, rose-red, nerveless, very variable in size and shape, dichotomously fastigiate or dilated and pinnate or palmate; axils rounded.



Sori large, oblong, scattered over the whole frond.—Harv. Phyc. Brit. t. 202, 203; J. Ag. Sp. Alg. ii. 659.

**Campbell's Island, J. D. H.** (Tasmania, N. Atlantic, and Pacific Oceans.)—Specimens imperfect.

5. **N. denticulatum**, Harv. in *Fl. N. Z.* ii. 241. Frond sessile or narrowed below into a cuneate stipes, above flabelliform, dichotomously branched, or undivided or deeply divided; margin erose and crisped; tips obtuse; stipes sometimes produced upwards and branched. Sori ovate or oblong, excessively numerous, scattered over the whole frond.

Maketu, Chapman; Blind Bay, Davies; Cook's Straits and East coast, Lyall.

6. **N. variolosum**, Harv. in *Fl. N. Z.* ii. 241. Frond rose-red, 2–3 in. long, shortly stipitate, below narrowed into a thickened cuneate stipes, above dichotomously palmate-partite; segments decompoundly multifid, obtuse, upper narrower, covered with scattered cilia or processes; axils patent. Sori scattered, thickened into convex tubercles, containing few tetraspores.

East coast, Colenso; Banks's Peninsula, Lyall.

7. **N. ? suborbiculare**, Harv. in *Fl. N. Z.* ii. 242. Frond rose-red, delicately membranous, sessile or with a setaceous stipes, suddenly expanding into an entire suborbicular lamina 1 in. broad, entire crenate or lobed; substance of one layer of angular cells. Sori and coneptacles scattered over the whole frond.

Parasitic, Hawke's Bay, Colenso; Cook's Straits, Lyall.—A curious plant, of doubtful affinity, perhaps to be referred to *Rhodymenia*; if a new genus, Harvey proposes that it should be called *Abroteia*.

†† Frond with evident nerves.

8. **N. multinerve**, Hook. f. and Harv.;—*Fl. N. Z.* ii. 241. Frond rose-red, shortly stipitate, 2–4 in. long, rounded or cuneate at the base, simple or cut into numerous ribbon-like segments, which are traversed by numerous parallel distinct nerves.—*Fl. Antarct.* 473; Harv. Ner. Austr. 119; J. Ag. Sp. Alg. ii. 666.

Massacre and Chalky bays and Stewart's Island, Lyall. (Tasmania, Fuegia.)

9. **N. crispatum**, Hook. f. and Harv. in *Fl. Antarct.* 185. t. 71. f. 1. Frond rose-red, 3–4 in. long, stipitate, oblong or broadly expanded from a cuneate decompound dichotomous and subpinnately lacinate base, with branched basal nerves; segments cuneate, tips and axils obtuse; margins crenulate and crisped. Sori minute, dot-like, scattered over the whole frond.—Harv. Ner. Austr. 120; J. Ag. Sp. Alg. ii. 664.

**Campbell's Island, J. D. H.**

10. **N. D'Urvillæi**, J. Agardh;—*Fl. N. Z.* ii. 240. Frond 6–10 in. long, narrowed into a stout cylindric dichotomous stipes, 1–3 in. long, palmately dichotomous, the stipes branching into the segments, which are linear subcuneate, the lower crisped, the upper slightly undulate; terminal lobes linear-oblong, very obtuse; divisions of the costa produced nearly to the tops of the laciniae. Sori dot-like, thickly scattered over the upper lobes.—

J. Ag. Sp. Alg. ii. 667. *Dawsonia*, Bory, Voy. Coquil. t. 19. f. i. *Aglaophyllum*, Mont. in Voy. Bonite, 111.

Ruapuke Island in Foveaux Straits, *Lyall*. (Chili.)

## 56. PHACELOCARPUS, Endlicher.

Frond red, slender; midrib strong, compressed, distichously pectinate or subterete, 4-fariously aculeate; structure of three strata, surrounding an articulate tube; medullary of longitudinal densely interlaced filaments; intermediate of larger roundish cells; cortical of minute coloured cells in vertical lines. Conceptacles external, pedicelled or sessile, imperfectly known. Receptacles ovoid or globose, containing numerous cavities in which are zoned tetraspores mixed with unicellular peranemata.

A genus of one species of uncertain affinity.

1. **P. Labillardieri**, *J. Agardh*, *Sp. Alg.* ii. 648;—*Fl. N. Z.* ii. 242. Root a broad disk. Frond dark-red, 1-3 ft. high,  $\frac{1}{20}$ — $\frac{1}{12}$  in. diameter, excessively branched; branches irregular, the smaller closely pinnate or 2-pinnate, all of them pectinate with subulate branchlets. Receptacles ovoid, axillary, pedicelled, ovoid.—Harv. Phyc. Austr. iii. t. 163. *Euctenodus* and *Ctenodus*, Kuetzing. *Sphærococcus*, Agardh.

Laminarian zone and deeper water, abundant along all the shores, *Sinclair*, *Colenso*, etc. (Australia, Tasmania.)

## 57. CALLIBLEPHARIS, Kuetzing.

Frond dull-red, flat, between cartilaginous and membranous, dichotomously pinnate and fimbriate; structure of two strata; medullary of several series of large roundish angular cells; cortical of minute coloured cellulæ. Conceptacles sessile, thick-walled, enclosing a tuft of moniliform spore-threads. Tetraspores zoned, scattered amongst the cortical cells.

A fine genus, native of both temperate zones.

1. **C. ? tenuifolia**, *Harv. in Fl. N. Z.* ii. 243. Frond 6-8 in. long, 1 in. broad, bright rose-red, delicately membranous, dichotomously pinnate; margins proliferous; segments much attenuated at the base, often subciliate and toothed. Tetraspores scattered, transversely divided.

Chalky Bay, *Lyall*.—Dr. Harvey remarks that in the absence of conceptacles the genus of this plant is doubtful; it may be a *Rhodophyllis*.

## 58. SARCODIA, J. Agardh.

Frond rose-red, fleshy, cartilaginous when dry, flat, repeatedly dichotomously-branched and bearing marginal segments; structure of 3 strata; medullary of loosely interlaced filiform cells; intermediate of rounded angular cells, gradually passing into the other stratum of minute vertical rounded cells. Conceptacles hemispheric, thick-walled, on the disk and margins of the frond, opening by a pore, enclosing obovate spores arranged on dichotomously-branched

tomous filaments which radiate from a central receptacle. Tetraspores scattered, transversely divided.

A genus of a single species.

1. **S. Montagneana**, *J. Ag. Sp. Alg.* ii. 623;—*Fl. N. Z.* ii. 242. Frond 4–8 in. long, cuneate at the base, then expanding into dichotomous lobes  $\frac{1}{2}$ – $1\frac{1}{2}$  in. broad, tips often truncate and proliferous; axils obtuse.—*Rhodymenia Montagneana*, Hook. f. and Harv.; Harv. Ner. Austr. t. 48. *Rhodophyllis Montagneana*, Kuetzing.

Bay of Islands, *J. D. H., Lyall.*

## 59. GRACILARIA, Greville.

Frond dull red, cartilaginous, cylindric, compressed or rarely flat, irregularly branched; structure of two strata; medullary of large angular colourless cells, surrounded by smaller coloured ones; cortical of minute coloured cells in vertical lines. Conceptacles conical or hemispherical, sessile, thick-walled, at length opening by a pore, enclosing obovate spores arranged on a tuft of filaments. Tetraspores cruciate or 3-parted, scattered beneath the cortical cells.

A large genus, found in both temperate zones.

1. **G. confervoides**, *Grev.*;—*Fl. N. Z.* ii. 243. Fronds tufted, purple, subcartilaginous, 2 in. to 2 ft. long, as thick as a sparrow- or crow-quill, very variable in branching, etc.; branches long, undivided; branchlets subsecund, filiform close-set, filiform attenuate at both ends. Conceptacles hemispherical, extremely numerous. Tetraspores also abundant, on thickened filiform branchlets.—Harv. Phyc. Brit. t. 65; *J. Ag. Sp. Alg.* ii. 587.

Probably common, from Hawke's Bay, *Colenso*, to Ruapuke, *Lyall*. (Native of both temperate oceans.)

2. **G. multipartita**, *Harv.*, var. *polycarpa*, *J. Ag. Sp. Alg.* ii. 601. Frond between cartilaginous and membranous, 4–12 in. high, dull purple, flattened, cleft to the base palmately or dichotomously; segments linear-cuneate, acute, entire, jagged or multifid. Conceptacles scattered over the whole surface of the frond.—Harv. Phyc. Brit. t. 15; *J. Ag. Sp. Alg.* ii. 601.

Blind Bay, Cook's Straits, *Lyall*. (Native of both temperate and tropical oceans.)

3. **G. coriacea**, *Harv.*;—*Fl. N. Z.* ii. 243. Closely resembling *G. multipartita*, but much thicker, more coriaceous, minutely wrinkled when dry, and the tips of the segments obtuse. Conceptacles deeply sunk in the frond, depressed at the apex with a large pore.—*Rhodymenia? coriacea*, Hook. f. and Harv. in Lond. Journ. Bot. iv. 545.

Bay of Islands, Cook's Straits, *Lyall*; Otago, *Lindsay*.

## 60. MELANTHALIA, J. Agardh.

Frond deep purple, linear, flat, dichotomously flabellately branched, coriaceous, solid, densely cellular; inner substance of colourless elongate angular

cells, outer of many series of most minute coloured cells. Conceptacles marginal, thick-walled, hemispherical; spores on moniliform filaments, covering a prominence on the floor of the conceptacle. Tetraspores unknown.

An Australian and New Zealand genus.

1. **M. abscissa**, *Hook. f. and Harv. Fl. N. Z.* ii. 242. Fronds tufted, blackish when dry, 2–3 in. long, fastigiately dichotomously decompose; segments 2-edged; margins obtuse, unequally thickened here and there, lower  $\frac{1}{2}$  in. long, upper narrower, subcuneate below the forkings.—*J. Ag. Sp. Alg.* ii. 613. *Fucus*, *Turn. Hist.* t. 137. *Chondrococcus*, *Kuetzing*.

New Zealand, *Banks*.

2. **M. Jaubertiana**, *Mont.*;—*Fl. N. Z.* ii. 242. Frond similar to *M. abscissa*, but larger, 4–6 in. long; segments quite equal throughout.—*J. Ag. Sp. Alg.* ii. 613.

Common along all the coasts. (Tasmania.)

## 61. GELIDIUM, Lamouroux.

Frond dull red or purplish, linear, compressed, pinnate, horny, solid; axis of densely interlaced tenacious fibres; walls of small polygonal cells, the outermost minute in horizontal series. Conceptacles 2-celled, formed of two opposite confluent conceptacles, immersed in swollen branchlets, containing oblong spores which are attached to the walls of the septum. Tetraspores forming sori on dilated branchlets.

Native of both temperate zones.

1. **G. corneum**, *Lamour.*;—*Fl. N. Z.* ii. 243. Frond 2–6 in. high, between cartilaginous and horny, nearly flat, distichously branched, setaceous or more or less stout; branches 1–2-pinnate, linear, attenuated at each end, pinnules mostly opposite, spreading, obtuse, bearing elliptic conceptacles within their apices.—*Harv. Phyc. Brit.* t. 53; *J. Ag. Sp. Alg.* ii. 469.

Probably abundant, Hawke's Bay, *Colenso*; Banks's Peninsula, *Lyll*. (All seas.)

2. **G. asperum**, *Grev.*;—*Fl. N. Z.* ii. 243. Frond very variable in size, two-edged, decompose pinnate; pinnæ linear, narrowed at both ends, rather regularly again pinnate, serrulate.—*J. Ag. Sp. Alg.* ii. 475.

New Zealand, *Baume* (*J. Agardh*, l. c.) (Australia.)

## 62. CAULACANTHUS, Kuetzing.

Frond purplish-brown, black when dry, terete, excessively branched; branchlets aculeate, cartilaginous; axis of young parts tubular, of a single flexuous articulate tube, giving off alternate branches which divide excessively, their divisions becoming packed and forming the surface; adult part altogether cellular. Conceptacles unknown. Tetraspores in slightly swollen branchlets, sunk in the cortical threads, transversely divided.

A curious genus, of a N. Atlantic species and the following.

1. **C. spinellus**, *Kuetz.*;—*Fl. N. Z.* ii. 244. Fronds  $1\frac{1}{2}$ –1 in. long,



setaceous, forming broad tufts, rigid, irregularly excessively branched; branches very spreading, simple or forked, set with horizontal, often secund spinous branchlets.—J. Ag. Sp. Alg. ii. 434. *Rhodomela ? spinella*, Hook. f. and Harv. in Lond. Journ. Bot. iv. 534.

Common on all the shores, on Corallines, shells, etc., *Colenso*.

### 63. HYPNEA, Lamouroux.

Frond pink or dull purplish, filiform, much branched; branchlets subulate, cartilaginous; axis fibrous or cellular, dense, surrounded by several series of colourless polygonal cells, which decrease externally, outer series minute, coloured. Conceptacles sessile or immersed, thick-walled, containing stalked spores attached to filaments. Tetraspores zoned, sunk in the surface of swollen branchlets.

Natives of both temperate zones.

1. **H. musciformis**, *Lamour.*;—*Fl. N. Z.* ii. 244. Frond tufted, dark green and purple, excessively branched, 4–6 in. high; branches filiform, incurved, thickened at the tips; branchlets spreading, sporiferous, pod-like, lanceolate, beaked; those bearing the conceptacles with divaricating spinescent divisions.—J. Ag. Sp. Alg. ii. 442.

New Zealand, *Banks and Solander*. (N. S. and tropical Atlantic, Indian Ocean, Pacific, Australia.)—I have seen no N. Z. specimens.

2. **H. ? multicornis**, *Mont. Voy. au Pôle Sud*, 152. t. 9. f. 1;—*Fl. Antarct.* 187. Frond 2–3 in. long, compressed, excessively corymbosely branched, ultimate branchlets subdistichous, alternate or subsecund, forked; branchlets spreading, recurved, hooked. Fruits in the thickened tips of the hooked branchlets.—*Rhodomela*, *Mont.*

**Lord Auckland's** group, *D'Urville*.

### 64. PTEROCLADIA, J. Agardh.

Frond red, linear, flat, 2-edged; midrib strong or indistinct, pinnate; structure of 3 strata; medullary of densely packed longitudinal fibres; intermediate of larger roundish cells; cortical of moniliform rows of coloured minute cells vertically placed. Conceptacles thick-walled, hemispherical, 1-locular, on one surface of the frond, containing obovate stalked spores; spores inserted on a parietal receptacle which is united to the pericarp by delicate filaments. Tetraspores cruciate, forming sori on dilated branchlets.

Differs from *Gelidium* in the 1-celled conceptacle.

1. **P. lucida**, *J. Agardh*;—*Fl. N. Z.* ii. 244. Root branching. Frond extremely variable, 6–18 in. long, red-purple,  $\frac{1}{12}$ – $\frac{1}{4}$  in. broad, pinnately decomposed, variable in breadth and branching; often proliferous; pinnules thin, flat, long or short and crisped; midrib strong or faint.—J. Ag. Sp. Alg. ii. 483. *Gelidium*, *Sond.*; *Fucus*, *Br. in Turn. Hist.* t. 238.

Common throughout the islands. (W. and S.W. Australia.)

65. **APOPHLŒA**, Harvey.

Frond red-purple, black when dry, spongy, cylindric, densely dichotomously fastigate, of 2 strata of cells; axis of dense, slender, anastomosing threads; cortical of vertical, elongate, dichotomous, articulate threads, immersed in a soft gelatine. Conceptacles scattered, immersed in the cortical threads, enclosing parietal fascicled threads. Tetraspores transversely divided.

A curious genus, confined to New Zealand.

1. **A. Sinclairii**, *Harv. in Fl. N. Z.* ii. 244. *t.* 116 B. Root a broad leathery disk. Fronds 1 in. high, very stout, densely fastigate; branches short, thick, obtuse.—*J. Ag. Sp. Alg.* ii. 458.

Common on rocks, *Colenso*, etc.

2. **A. Lyallii**, *Hook. f. and Harv. Fl. N. Z.* ii. 244. *t.* 166 A. Frond 5–6 in. high, with a slender stipes thickening upwards,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diameter, then forking repeatedly; branches flexuous, patent, stout; axils rounded; tips obtuse.

Preservation Harbour and Otago, *Lyall*.

66. **PEYSSONNELLIA**, Decaisne.

Frond dull red or brownish, flat, broad, fan-shaped, rooting by fibrils from the lower surface, zoned; structure of 2 strata, that of the lower surface of horizontal cylindric cells, cohering in longitudinal filaments, that of the upper surface of similar cells in lines at right angles to the others. Conceptacles superficial, containing either globular spores in moniliform filaments or cruciate tetraspores.

A scarce genus in the northern seas, where one species exists on the Mediterranean and Atlantic coasts; more common in the south temperate zone.

1. **P. rugosa**, *Harv. in Fl. N. Z.* ii. 245. Frond 1–2 in. broad, dark, red-brown, attached by the whole lower surface, between membranous and coriaceous, orbicular, wrinkled over the whole surface. Fructification unknown.

Cape Kidnapper, on the surface of rocks covered with sand, *Colenso*.

67. **NEMALION**, Duby.

Frond red or purple, cylindric, gelatinous, elastic, dichotomous; structure of 3 strata; medullary of long, subsimple, interlaced filaments, which radiate outwards, forming the second stratum; this consists of a layer of anastomosing, horizontal, fastigate, dichotomous, moniliform threads, invested in gelatine, the tips of which constitute the outermost stratum or periphery. Spore-mass spherical, of many clavate radiating spore-threads, immersed in the peripheric threads. Tetraspores triangularly divided, in the terminal cells of the peripheric filaments.

Natives of northern and southern temperate zones.

1. **N. ramulosum**, *Harv. in Fl. N. Z.* ii. 245. Frond 6 in. long,  $\frac{1}{6}$ – $\frac{1}{4}$  in. broad, compressed, once or twice forked, irregularly densely set with spreading branches and branchlets; branches unequal, 1–2 in. long, horizontal, obtuse, simple, or again set with lateral often forked branchlets. Fructification unknown.

Otea, *Lyall*.

#### 68. SCINAIA, Bivona.

Frond red, terete or compressed, dichotomous, between gelatinous and membranous, filled with fluid gelatine, traversed by a fibrous axis, from which slender branched filaments radiate to the periphery, which is formed of a thin stratum of small angular cells. Spore-masses globular, of jointed spore-threads, enclosed in a membrane, suspended on the inner wall of the frond, bearing pyriform spores.

A genus of only one known species.

1. **S. furcellata**, *Bivona*;—*Fl. N. Z.* ii. 245. Frond tender, rose or lake-red, 2–4 in. long, cylindric, diameter from a sparrow's to a swan's quill, branched, with a semicircular outline; tips and axils obtuse.—*J. Ag. Sp. Alg.* ii. 422. *Ginnania*, *Mont.*; *Harv. Phyc. Brit.* t. 69. *Myclomium*, *Kuetzing*.

East coast, *Cunningham*? (Europe, N. America, Chili, Pacific, Tasmania, S. Africa.)

#### 69. WRANGELIA, Agardh.

Frond rose-red or purplish, filiform, articulate, branched, of a single tube, sometimes coated with minute cells; branchlets minute, opposite or whorled round the nodes. Spore-masses usually involucrate, containing several clusters of spores in the uppermost whorls of the branchlets. Tetraspores 3-parted, scattered on the branchlets.

A beautiful small genus, native of both temperate zones.

1. **W. Lyallii**, *Harv. in Fl. N. Z.* ii. 236. Frond flaccid, carmine-red, setaceous, 4–5 in. long, pinnate or 2-pinnate, pellucid above, veined near the base; branchlets elongate, articulate, simple, with whorled or opposite branchlets at the nodes; branchlets pinnate; articulations not coated with cells; walls thick, of the branches many times longer than broad. Tetraspores sessile on the inner faces of the branchlets, 1–2 at each node. Spore-masses minute, terminal, hardly involucrate.

Ruapuke and Preservation Harbours, *Lyall*.

2. **W. (?) squarrulosa**, *Harv. in Fl. N. Z.* ii. 236. Frond rigid, setaceous, articulate throughout, distichously branched; branches opposite and alternate, very compound, loosely divided or closely pinnate or 2-pinnate; pinnæ usually opposite; branchlets minute, squarrose, whorled, clothing the nodes, dichotomously multifid, spinescent; articulations 2–3 times longer than broad, not coated with cells. Tetraspores sessile on lateral branchlets.

Preservation Harbour, *Lyall*.—Dr. Harvey describes two varieties, both gathered on the same spot, one pinnate with the pinnæ opposite and very close; the other vaguely branched, scarcely pinnate. The genus is doubtful, the spore-masses being unknown.

## 70. RHODYMENIA, Greville.

Frond flat, dull or rose-red or purplish, ribless, membranous, dichotomous, palmate or flabellate; structure of 2 strata of cells; medullary large, oblong, polygonal; cortical minute, in vertical lines, coloured. Conceptacles scattered over the frond or in sori near the tips of the segments, sessile, hemispherical, thick walled, opening by a pore, enclosing a dense tuft of sporiferous filaments in gelatine. Tetraspores cruciate or 3-partite, scattered or in sori.

A large genus in both temperate zones.

§ 1. *Tetraspores scattered over the surface of the frond.*

1. **R. sanguinea**, *Harv. in Fl. N. Z.* ii. 248. Frond 12–14 in. long, purplish blood-red, firmly membranous, with a cylindric stipes and cuneate base, deeply laciniate; segments broad or narrow, cuneate, attenuated; margins simple or foliiferous; leaflets cuneate; axils rounded. Conceptacles very numerous, scattered densely over the whole frond. Tetraspores abundant on the smaller segments.

Foveaux Straits, *Lyall*.

2. **R. lanceolata**, *Harv. in Fl. N. Z.* ii. 248. Segments of the frond 6–8 in. long, quite simple, narrow,  $\frac{1}{4}$  in. broad, tapering to the base and acute apex, purple red; fruit as in *R. sanguinea*.

Port Cooper, *Lyall*; Otago, *Lindsay*.—Perhaps only a variety of *R. sanguinea*, with simple longer segments, but the substance is softer, and the cortical layer more developed.

3. **R. prolifera**, *Harv. in Fl. N. Z.* ii. 249. Frond dull red-brown, 4–8 in. long, cuneate at the base, with a short stipes; axils rounded; segments spreading,  $\frac{1}{4}$ –1 in. wide, linear or subnneate, sparingly divided, proliferous at the apex; leaflets often stipitate, linear, acute or attenuate at the base, simple or forked. Sori indefinite, remote from the attenuated tips of the segments.

Hawke's Bay, *Colenso*.—Similar to *R. linearis*, but larger, thicker, generally proliferous, and with differently placed tetraspores.

4. **R. ornata**, *Mont.*;—*Fl. Antarct.* 186. Frond bright purple, sub-carnose, oblong lanceolate, very broad, proliferous on the margins; segments or leaflets obovate, substipitate, very large, palmately lobed. Conceptacles scattered over the whole frond.—*Mont. Voy. au Pôle Sud*, 149. t. 11.

**Lord Auckland's** group, *D'Urville*.—Unknown to us? Consistence of *Iridæa edulis* (*Mont.*)

§ 2. *Tetraspores collected in sori towards the tips of the segments.*

5. **R. linearis**, *J. Ag.*;—*Fl. N. Z.* ii. 248. Frond elongate, 4 in. long, decompound; segments narrow, flabellate, altogether linear,  $\frac{1}{12}$ – $\frac{1}{6}$  in. broad, terminal obtuse or emarginate; axils subacute. Conceptacles apiculate, never marginal, scattered over the disk of the frond. Tetraspores below the tips of the segments.—*J. Ag. Sp. Alg.* ii. 379. *R. Palmetta*, *Hook. f.* and *Harv. in Lond. Journ. Bot.* vii. 444, not of Greville.



East coast, *Colenso*; Otago, *Lyll*. **Lord Auckland's** group and **Campbell's** Island, *Turnbull*, *J. D. H.*

6. **R. corallina**, *Grev.*;—*Fl. N. Z.* ii. 248. Frond bright red or purplish, a foot long, broader than long, flabellately decompound, with a terete stipes, cuneate at the base; segments linear,  $\frac{1}{4}$ — $\frac{1}{2}$  in. broad, linear or subcuneate; axils rounded. Conceptacles crowded on the disk of the penultimate segments. Tetraspores in sori towards the tips of the fronds.—*J. Ag. Sp. Alg.* ii. 379. *Sphærococcus*, *Bory, Voy. Coquille*, t. 16.

East coast and Cook's Straits, *Lyll*. **Lord Auckland's** group, *Hombrook*. (Tasmania, Kerguelen's Land, Chili.)

7. **R. dichotoma**, *Hook. f. and Harv. Fl. Antart.* i. 186. t. 72. f. 1; *Fl. N. Z.* ii. 248. Frond rose-red, membranous, very broad from a cuneate base; axils rounded; segments spreading, linear or cuneate, obtuse, at length emarginate or 2-fid.—*Callophyllis*, *Kuetzing*.

Queen Charlotte's Sound, *Lyll*; **Campbell's** Island, *J. D. H.*

*Section doubtful.*

8. **R. epimenioides**, *Harv. in Fl. N. Z.* ii. 248. Frond rose-red, delicately membranous, many times dichotomous, flabelliform, narrowed at the base into a short cartilaginous stipes, which is produced into the frond as a short costa; segments linear or cuneate, very obtuse,  $\frac{1}{2}$  in. wide; axils rounded or subacute. Fructification unknown.

Otago Harbour, *Lyll*, *Lindsay*.—Very similar to *R. dichotoma*, but the cells of the medullary stratum are larger, thin-walled, and rapidly expand when moistened; it also resembles *Epymenia obtusa*, but has a totally different structure.

## 71. RHODOPHYLLIS, Kuetzing.

Frond rose-red, flat, membranous, dichotomously or pinnately decompound, usually margined by slender leafy processes; structure of 2 strata; medullary of large, colourless, roundish angular cells; cortical of one or few series of coloured minute cells. Conceptacles marginal, external, containing a compound nucleus of radiating bundles of spore-threads, enclosed in a membrane. Tetraspores zoned, immersed in the cortical cells of the frond on its marginal processes.

A small genus, native of both temperate zones.

1. **R. bifida**, *Kuetzing*. Frond bright red or purplish, delicately membranous, decompound, subflabellate, 1–2 in. long; segments fastigiate, linear or cuneate,  $\frac{1}{6}$ — $\frac{1}{4}$  in. broad, terminal, obtuse; margins entire, often set with crowded confluent leafy cilia. Conceptacles marginal or scattered over the terminal lobes. Tetraspores in clouded sori.—*J. Ag. Sp. Alg.* ii. 388.

**Lord Auckland's** group, *D'Urville*. (Atlantic, Mediterranean and Pacific Oceans.)—I have seen no southern specimens.

2. **R. Gunnii**, *Harv. in Fl. N. Z.* ii. 247. Frond decompoundly pinnatifid, rose-red, delicately membranous, 8–12 in. long; segments alternate or subopposite, sub-2-pinnatifid, close set; ultimate toothed; tips obtuse; axils

rounded. Conceptacles marginal. Tetraspores scattered towards the tips of the segments.—*Cladhymenia*, Harv. in Lond. Journ. Bot. iv. 540; Ner. Austr. t. 32 (tetrasp. incorrect); J. Ag. Syst. Alg. ii. 386. *Callophyllis*, Kuetzing.

Chalky Bay and Preservation Harbour, *Lyall*. (Tasmania.)

3. **R. membranacea**, *Hook. f. and Harv. in Fl. N. Z.* ii. 247. t. 117. Frond similar to that of *R. Gunnii*, dotted over with red specks, often profusely fimbriate; segments alternate; primary broad; secondary narrow; ultimate linear-oblong, subacute, narrowed at the bases; axils rounded. Conceptacles marginal. Tetraspores confined to the ultimate segments.—*Rhodymenia* and *Halymenia*, Harv. in Lond. Journ. Bot. vi. 405 and 448. *Stictophyllum*, Kuetzing. *Euthoria*, J. Ag. Sp. Alg. ii. 385.

East coast, *Colenso*; Cook's Straits, *Lyall*. (Tasmania.)

4. **R. (?) angustifrons**, *Harv. in Fl. N. Z.* ii. 247. Fronds densely tufted, 2–3 in. high, membranous, deep red, excessively dichotomously or irregularly branched from a narrow base; segments divaricate, dichotomous, 3-multifid, linear,  $\frac{1}{2}$  in. broad; terminal often secund, obtuse or acute; axils rounded. Fructification unknown.

Port Nicholson and Bluff Harbour, *Lyall*.—Genus doubtful.

5. **R. (?) lacerata**, *Harv. in Fl. N. Z.* ii. 247. Frond rose-red, delicately membranous, subdichotomous, narrowed into a cartilaginous filiform stipes; primary segments broad; secondary narrower, dichotomously multifid; ultimate elongate, attenuate, almost subulate, here and there sparingly toothed. Fructification unknown.

Port William, on rocks, *Lyall*.—Genus doubtful.

## 72. DASYPHLOEA, Montagne.

Frond rose-red or purple, cylindric, dendroid, between gelatinous or cartilaginous and membranous, coated with microscopic hyaline hairs; structure complex; central axis an articulate filament; intermediate of branching radiating moniliform filaments; cortical membranous, of several series of minute coloured cells. Conceptacles immersed in the branchlets, containing tufts of moniliform spore-threads, radiating from a central axis. Tetraspores zoned, in wart-like thick-walled conceptacles.

A genus of N. Australian and New Zealand species.

1. **D. insignis**, *Mont. in Voy. au Pôle Sud*, 102. t. 8. f. 3;—*Fl. N. Z.* ii. 254. Frond rose-purple, 6–8 in. long, very delicate, subtubular, as slender as a crowquill, broadly ovate in outline, vaguely decompoundly branched; branches spreading, attenuate at both ends.—J. Ag. Sp. Alg. ii. 215.

Akaroa, *D'Urville*.

## 73. PLOCAMIUM, Lyngbye.

Frond bright pink, between membranous and cartilaginous, flat or com-

pressed, linear, pinnately decomposed; pinnules short, acute, alternately secund in pairs or threes or fours, of 2 strata of cells; inner cells oblong, longitudinal; outer small, polygonal coloured. Conceptacles sessile or stalked, hemispherical, opening by a pore, containing a mass of angular spores, on filaments which radiate from the base. Stichidia containing oblong transversely-parted tetraspores.

A genus of most beautiful *Algæ*, found in both temperate zones.

§ 1. *THAMNOPHORA*.—*Frond usually membranous, flat, ecostate or with a slender costa; branchlets alternately in pairs; conceptacles and stichidia axillary.*

1. **P. procerum**, *J. Agardh*;—*Fl. N. Z.* ii. 246. Root branching. Frond 1–2 ft. long, linear, almost ribless, pectinate-pinnate,  $\frac{1}{2}$ – $\frac{1}{4}$  in. diameter, bright pink; pinnæ alternately geminate, lower one and divisions of the upper from a broad base, acuminate, subulate, entire or externally serrulate. Conceptacles axillary, stalked, 1–4 together. Stichidia axillary, tufted, simple, falcate, acute.—*Harv. Phyc. Austr.* iv. t. 223; *Ner. Austr.* 122.

**New Zealand**, *Lyall*. (Australia, Tasmania.)

2. **P. Corallorhiza**, *Harv. Fl. N. Z.* ii. 245. Root branching. Frond 12–18 in. long, clear red, stipitate, membranous, broadly linear,  $\frac{1}{2}$  in. broad, subcostate at the base, pinnate or 2-pinnate; segments alternately geminate, lower shortly subulate, upper incised or pinnatifid; outer margin of each segment serrate. Conceptacles pedicelled, and stichidia axillary, crowded.—*Harv. Ner. Austr.* 121; *J. Ag. Sp. Alg.* ii. 402.

Dusky Bay, *Forster*.—Perhaps the habitat is erroneous. (South Africa.)

3. **P. costatum**, *Hook. f. and Harv. Fl. N. Z.* ii. 246. Frond narrow, membranous, flat, a foot long,  $\frac{1}{2}$  in. wide, decomponently-pinnate, with a stout percurrent costa; pinnæ lanceolate, alternately geminate, lower subulate, upper elongate, laciniate, falcate or straight; outer margin of the segments serrate. Stichidia axillary, crowded, many times forked.—*Harv. Ner. Austr.* 122; *J. Ag. Sp. Alg.* ii. 403. *Thamnophora Cunninghamii*, *Grev.*

Common in the Bay of Islands, etc., *Cunningham*. (Australia, Tasmania.)

4. **P. angustum**, *Hook. f. and Harv. Fl. N. Z.* ii. 246. Frond rather cartilaginous, 6 in. long,  $\frac{1}{20}$  in. broad, with a stout decurrent costa, decomponently pectinately pinnate; pinnæ alternately geminate, lower subulate, upper elongate, laciniate; outer margin of the segments quite entire. Conceptacles solitary. Stichidia crowded, axillary.—*Harv. Ner. Austr.* 122; *J. Ag. Sp. Alg.* ii. 402.

Common from the Bay of Islands to Otago. (Australia, Tasmania.)

5. **P. cruciferum**, *Harv. in Fl. N. Z.* ii. 246. Scarcely to be distinguished by habit or other characters from *P. angustum*, except in the stichidia, which are cruciform or palmately lobed, or even multi-radiate, with lobes short, the whole crowded with tetraspores.

East coast, *Colenso*.

6. **P. abnorme**, *Hook. f. and Harv. Fl. N. Z.* ii. 246. Frond 1–2 in. high, narrow, slender, with an obsolete costa, pinnately decomposed; pinnæ

and pinnules alternately geminate, ultimate very narrow; branches subulate, quite entire, acute. Stichidia axillary, subsolitary, lanceolate, simple or forked, sometimes formed of the ultimate pinnules.—Harv. Ner. Austr. 123. t. 42; J. Ag. Sp. Alg. ii. 401.

Bay of Islands, *Cunningham*, etc.; Maketa, *Chapman*.

7. **P. dispernum**, *Harv. in Fl. N. Z.* ii. 246. Frond 6–12 in. high,  $\frac{1}{2}$  in. broad, stipitate, costate, decompoundly pectinate-pinnate, subflabellate; pinnæ alternately geminate, lower and laciniaæ of the upper narrow, subulate, acute, quite entire. Conceptacles supra-axillary, sessile, scattered. Stichidia extremely minute, axillary, decompoundly branched or lobed; lobes ovoid or oblong, stalked, each with about 2 large tetraspores filling the lobe.

East coast, *Colenso*; Foveaux and Cook's Straits, *Lyall*.

§ 2. **EUPLOCAMIMUM**.—*Frond cartilaginous, plano-compressed; branches alternately in threes or fours; conceptacles and stichidia scattered, lateral on the branches.*

8. **P. coccineum**, *Lyngbye*;—*Fl. N. Z.* ii. 246. Fronds tufted, 2–12 in. long, compressed, 2-edged,  $\frac{1}{2}$  in. diameter, excessively divided, divisions set throughout with patent alternate branches, and these again with distichous subulate branchlets, pectinate on the inner margin. Conceptacles solitary, sessile on the margins of the upper branches. Stichidia solitary, sessile, branched.—Harv. Ner. Austr. 123; Phyc. Brit. t. 44; J. Ag. Sp. Alg. ii. 395.

Abundant and very variable from the Bay of Islands to **Lord Auckland's** group and **Campbell's** Island. (Atlantic, Pacific, and Antarctic Oceans.)

#### 74. **STENOGRAMME**, Harvey.

Frond rose-red, membranous, flat, nerveless, dichotomously laciniate; structure of two strata; medullary of several rows of roundish angular cells; cortical of minute coloured cells. Conceptacles confluent into linear rib-like masses, containing minute spores within a thick integument. Tetraspores in superficial convex masses, formed in strings, cuneate.

A beautiful *Alga*, most abundant in New Zealand.

1. **S. interrupta**, *Montagne*;—*Fl. N. Z.* ii. 249. Root a small disk. Frond 6–12 in. long and broad, flabellate; stem short, at once dilating into the frond; laciniaæ  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad, with obtuse tips and axils.—Harv. Ner. Bor. Am. t. 19 C; Phyc. Brit. t. 157; Phyc. Austr. iv. t. 220; J. Ag. Sp. Alg. ii. 391.

Common along all the coasts, *Colenso*, etc. (Atlantic and Pacific Oceans.)

#### 75. **GYMNOGONGRUS**, Martius.

Frond dull red-brown or purplish, horny, coriaceous or rather fleshy, flat or filiform, dichotomously branched; structure of two strata; medullary of large colourless angular cells; cortical of moniliform minute coloured cells vertically disposed and set in gelatine. Conceptacles more or less prominent,



containing aggregate clusters of spores. Tetraspores developed from cells contained in thick-walled warts.

Natives of both temperate zones.

1. **G. furcellatus**, *J. Ag. Sp. Alg.* ii. 318;—*Fl. N. Z.* ii. 250. Frond tufted, 2–6 in. high, very variable, plano-compressed, dichotomously fastigiate, often secondly proliferous; segments narrow-linear, very variable. Conceptacles often in opposite pairs.—*Sphærococcus*, Agardh. *Gracilaria furcata* and *torulosa*, Hook. f. and Harv. in Lond. Journ. Bot. iv. 545, and vii. 444.

Common on the coasts, as far south as Otago. (Chili, Peru.)

2. **G. vermicularis**, *J. Ag. Sp. Alg.* ii. 323;—*Fl. N. Z.* ii. 250. Frond 2–4 in. long, tufted, purplish, subcompressed, almost terete,  $\frac{1}{20}$ – $\frac{1}{10}$  in. broad, dichotomously fastigiate, often secondly or fasciculately proliferous; terminal segments obtuse. Conceptacles crowded, rarely solitary, giving the frond a nodose appearance.—*Chondrus*, Grev.; *Fucus*, Turn. Hist. t. 221.

Milford Haven, *Lyall*. (S. Africa, Chili.)

## 75. CALLOPHYLLIS, Kuetzing.

Frond red, flat, rather broad, between membranous and fleshy, dichotomously and flabellately branched; structure of 2 strata of cells; medullary of large rounded cavities separated by a network of minute cells; cortical of vertical series of minute coloured cells. Conceptacles superficial or immersed, often marginal, thick walled, containing masses of spores. Tetraspores cruciate, dispersed through the cortical layer.

A handsome southern genus of numerous species.

1. **C. variegata**, *Kuetzing*;—*Fl. N. Z.* ii. 250. Frond purple-red, membranous, 6 in. long, decomponently pinnate; pinnæ close-set, lower simple, linear, upper decomposed, dilated, terminal obtuse, doubly-crenate. Conceptacles marginal, immersed.—*J. Ag. Sp. Alg.* ii. 302. *Rhodymenia*, Mont.; *Fl. Antart.* 475. *Sphærococcus*, Bory, Voy. Coquil. t. 14.

Tauranga, *Davies*. Lord Auckland's group, *D'Urville*. (Chili, Fuegia.)

2. **C. Hombroniana**, *Kuetzing*;—*Fl. N. Z.* ii. 251. Frond 1–2 ft. long, bright red-purple, decomponently pinnate, and subflabellately dichotomous from a flattened stipes; pinnæ erecto-patent, lower simple, linear, upper decomponently dilated with the margins fimbriate, terminal obtuse, toothed. Conceptacles immersed in the fimbriæ.—*J. Agardh, Sp. Alg.* ii. 303. *Rhodymenia*, Mont. in Voy. au Pôle Sud, 156. t. 1. f. 2; *Fl. Antart.* i. 186. t. 72. f. 2.

East coast, *Colenso*; Akaroa, *Raoul*; Foveaux Straits, *Lyall*; Otago, *Lindsay*. Lord Auckland's group, *Hombron*.

3. **C. acanthocarpa**, *Harv. in Fl. N. Z.* ii. 251. Very similar to *C. Hombroniana*, but the conceptacles are aculeate.

East coast and Port Cooper, *Colenso, Lyall*.

4. **C. coccinea**, *Harv.*;—*Fl. N. Z.* ii. 250. Frond membranous, deli-

cate, 4-6 in. long, bright red, 2-3-chotomous or multifid; segments narrow, linear,  $\frac{1}{8}$ - $\frac{1}{4}$  in. broad, pinnate on the margins; pinnæ like the segments, outer entire on the inner side above the sinus. Conceptacles immersed in the disk of the frond.—J. Ag. Sp. Alg. ii. 301. *Sphærococcus*, Harv. *Chondrococcus*, Kuetzing.

Tauranga, *Davies*. (Tasmania.)

5. **C. erosa**, *Hook. f. and Harv. Fl. N. Z.* ii. 250. *t.* 118. Frond crimson-purple, 6-12 in. long, sublinear, pinnately dichotomously decompound, densely or laxly branched; principal laciniae  $\frac{1}{4}$ - $\frac{1}{2}$  in. wide, erect or erecto-patent, elongate, more or less compound; margins with toothed or laciniate lobules or proliferous; axils all rounded. Conceptacles sessile, marginal, spherical.

Port Cooper and Foveaux Straits, *Lyall*; Otago, *Lindsay*.

6. **C. asperata**, *Harv. in Fl. N. Z.* ii. 250. Frond rosy-crimson, 4-5 in. long, delicately membranous, sessile, flabelliform, dichotomously palmate or decompound; segments  $\frac{1}{2}$ -1 in. broad, broader upwards, crenate and multifid at the fastigiate tip; margin flat or curved, fimbriate or often bearing cilia; surface generally rough, with minute subulate processes. Conceptacles immersed, scattered over the surface, convex.

Port Nicholson, *Lyall*.

## 77. **KALLYMENIA**, J. Agardh. .

Frond bright rose-red, broad, flat, ribless, between membranous and fleshy; structure of 3 strata of cells, innermost of matted anastomosing filaments; intermediate of large globular colourless cells; cortical of minute vertically-placed coloured cells. Conceptacles immersed often prominent, enclosing compound masses of spores. Tetraspores cruciately parted, scattered amongst the cortical cells.

Beautiful *Algæ*, natives of both cold zones.

1. **K. Harveyana**, *J. Ag. Sp. Alg.* ii. 288;—*Fl. N. Z.* ii. 251. Frond membranous, 6 in. long, bright red, with a very short stipes, broadly obovate or orbicular-cordate; margin entire, undulate. Conceptacles scattered over the whole frond, immersed, not prominent.—*Euhymenia*, Kuetzing.

Blind Bay, Cook's Straits, *Lyall*. (Cape of Good Hope.)

## 78. **GIGARTINA**, Lamouroux.

Frond dull purple or red, between cartilaginous and fleshy, flat or cylindric, simple or branched; structure of 2 series of cells; central, a lax network of cylindrical articulate filaments; cortical of moniliform vertical dichotomous filaments imbedded in firm gelatine. Conceptacles globose, opening by a pore, enclosing several dense clusters of spores held together by a network of filaments. Tetraspores cruciately-partite, collected in sori amongst the filaments of the surface.

A large genus, found abundantly in both cold, temperate, and tropical zones.

§ 1. *Frond terete or compressed; conceptacles submarginal on the more or less acuminate pinnules.*

1. **G. pistillata**, *Gmelin*;—*Fl. N. Z.* ii. 252. Fronds several together, 3–6 in. long, dull purple, horny when dry, compressed, stipitate, flabellately branched,  $\frac{1}{2}$ – $\frac{1}{2}$  in. diameter; branches forked, naked or pinnate with short horizontal subulate ramuli, which bear the conceptacles at or near their tips.—*Harv. Phyc. Brit.* t. 232; *J. Ag. Sp. Alg.* ii. 264. *G. divaricata*, *Fl. Antarct.* 187; *J. Ag. l. c.* 280.

Apparently common on the coast, *Colenso*, etc. **Campbell's Island**, *J. D. H.* (N. Atlantic Ocean).—A very variable plant in New Zealand.

2. **G. Chapmani**, *Hook. f. und Harv. Fl. N. Z.* ii. 251. t. 119 B. Frond 2 in. high, dull red, filiform, alternately decompoundly branched, compressed and channelled when dry; branches flexuous, variously divided; branchlets scattered, subulate, divaricate. Fructification unknown.

*Maketa*, *Chapman*.—Apparently allied to the British *G. acicularis*, but much more slender.

3. **G. Chauvinii**, *J. Ag. Sp. Alg.* ii. 268;—*Fl. N. Z.* ii. 252. Frond 1 ft. and more long, flat, linear, regularly pinnate, between membranous and cartilaginous, dark red or violet, decompoundly pinnate and proliferous from the disk; pinnæ distichous, patent, tips elongate, 3–4 in. long, mixed with shorter, sterile, ovate-lanceolate ones, fertile with numerous marginal conceptacles. Tetraspores forming a submarginal line.—*Sphærococcus*, *Bory in Voy. Coquille*, t. 20. *Chondroclonium*, *Kuetzing*.

**New Zealand**, *D'Urville*. (Peru, Chili, Fuegia.)

§ 2. *Frond thick, flat, subchannelled, pinnately decompound; conceptacles subsolitary on the disks of the pinnæ.*

4. **G. livida**, *J. Ag. Sp. Alg.* ii. 270;—*Fl. N. Z.* ii. 252. Frond purple or livid, a span high,  $\frac{1}{4}$ – $\frac{1}{3}$  in. broad, narrowed to a terete stipes below, 3-pinnate or more; pinnæ and pinnules distichous, linear or oblong-lanceolate, obtuse, fertile ones more obovate.—*Fucus*, *Turn. Hist.* t. 254.

**New Zealand**, *Banks and Solander*; *Paroa*, *Otago*, and *Jackson's bays*, *Lyall*, *Lindsay*. (Tasmania.)

§ 3. *Frond channelled, dichotomous or subpinnate; conceptacles umbilicate, numerous, submarginal on the convex surface of the frond.*

5. **G. alveata**, *J. Ag. Sp. Alg.* ii. 271;—*Fl. N. Z.* ii. 252. Frond 2–4 in. long, gregarious, linear, above fastigiately dichotomous,  $\frac{1}{2}$  in. broad; segments close-set, uppermost revolute; axils spreading, subacute.—*Chondrus*, *Grev.* *Fucus*, *Turn. Hist.* t. 239. *Mastocarpus*, *Kuetzing*.

Probably common, *Banks and Solander*, etc.

6. **G. ancistroclada**, *Montagne in Voy. au Pôlé Sud*, 121. t. 7. f. 4. Root discoid. Frond 2–3 in. high, linear,  $\frac{1}{2}$ – $\frac{1}{3}$  in. broad, shortly stalked, dark red-purple, rigid, channelled on one side, convex on the other, irregularly 2–3-pinnate; pinnæ alternate or subopposite, often secund; tips strongly incurved or hooked.—*Harv. Phyc. Austr.* iv. 197; *J. Ag. Sp. Alg.* ii. 272.

*Akaroa*, *D'Urville*; *Otago*, *Lyall*. (Tasmania.)

§ 4. *Frond thick, channelled, dichotomously or pinnately divided into cuneate or oblong segments; conceptacles on tubercles on both surfaces of the fronds.*

7. **G. decipiens**, *Hook. f. and Harv. in Fl. N. Z.* ii. 252. Frond small, cartilaginous, stipitate, flabelliform, flat, dichotomous; segments cuneate, repeatedly forked, ultimate narrow-linear, acute; axils rounded; margins simple or emitting short, stout, simple or pinnate linear branchlets. Fructification sessile, forming scattered oblong spots over the whole frond, or sessile warts immersed in the tips of the branchlets.—*Iridæa*, Lond. Journ. Bot. 1845, 547; *J. Ag. Sp. Alg.* ii. 257.

**New Zealand**, *Raoul*.

8. **G. stiriata**, *J. Ag. Sp. Alg.* ii. 277;—*Fl. N. Z.* ii. 252. Frond 3–6 in. long, violet-purple, thick, fleshy, below cylindric, stout, above compressed, slightly channelled, branched below; branches dilating into dichotomous or subpalmate leaflets, everywhere covered with simple or branched papillæ, which are obovate and often foliaceous. Conceptacles wart-like, solitary, or crowded on the papillæ.—*Mastocarpus*, Kuetzing. *Iridæa*, Bory. *I. volans*, Mont.? *Fucus*, Turn. Hist. t. 16.

*Paroa Bay, Lyall.* (Cape of Good Hope.)

9. **G. Radula**, *J. Ag. Sp. Alg.* ii. 278;—*Fl. N. Z.* ii. 252. Frond fleshy, flat, somewhat channelled below, 6 in. to 2 ft. long, simple or divided from the base into many large stipitate, obovate-oblong fronds or leaflets, of a fine red or anethyst-purple colour; margins and surfaces naked or papillose, or covered with small thick leaflets. Conceptacles subsolitary in the papillæ.—*Iridæa*, Bory. *Mastocarpus*, Kuetzing. *Fucus bracteatus*, Turn. Hist. Fuc. t. 25.

Abundant throughout the islands, and in **Lord Auckland's** group and **Campbell's** Island. (Throughout the Antarctic and N. and S. Pacific Oceans.)—A most abundant and variable plant, assuming various shapes as it is split by the waves, etc., often perforated.

## 79. IRIDÆA, Bory.

Frond dull red, broad, flat, nerveless, between cartilaginous and fleshy; central substance of densely interlaced longitudinal filaments; cortical of closely packed, vertical, coloured, moniliform filaments. Spore-masses immersed in the frond. Tetraspores forming a layer at the base of the filaments of the periphery.

Perennial *Algæ*, often very large, with rough surfaces; when cast up on the beach looking like great red-purple pieces of cloth; found in both temperate regions. The species are excessively variable and difficult to discriminate.

1. **I. micans**, *Bory*;—*Fl. N. Z.* ii. 252. Frond 1–2 ft. long, ovate-cordate or orbicular-ovate, obtuse, shortly stipitate, dark red-purple, iridescent; surface smooth; margins and fractures ciliated, with short, simple or divided spines.—*Bory in Voy. Coquille*, 110. t. 13 and 13 bis; *J. Ag. Sp. Alg.* ii. 254.

*Akaroa* and **Lord Auckland's** Island, *D'Urville*. (Australia and all Antarctic shores.)



2. **I. lanceolata**, *Harv. in Fl. N. Z.* ii. 252. Fronds numerous from the same base; stipes 1–2 in. long, cuneate at the base, then linear, gradually dilated upwards, pinnated below with spreading linear or lanceolate leaflets; above expanding into the lamina, which is 1–2 ft. long, red-purple, crisped and waved, 1–3 in. broad, lanceolate, tapering at both ends, between horny and membranous, rigid when dry.

Otago, *Lyall*.

3. **I. lusoria**, *Harv. in Fl. N. Z.* ii. 252. Frond stipitate, cartilaginous, simple, most frequently split; segments dilated or contracted, very proliferous, vaguely and inordinately produced.—*Rhodymenia*, *Grev. in Hook. Comp. Bot. Mag.* ii. 329.

East coast, *Cunningham*; Otago, *Lindsay*. (Specimens very imperfect.)—A very doubtful plant.

4. **I. laminarioides**, *Bory in Voy. Coquille*, 105. t. 11. f. 1. Fronds gregarious, linear-obovate, violet-purple or livid-purple, obovate, narrowed to a channelled stipes 1–2 in. long, usually split into erect or spreading linear-lanceolate segments, which are produced to a point.—*Mont. in Voy. au Pôle Sud*, 105; *J. Ag. Sp. Alg.* ii. 253.

**Lord Auckland's** group, *D'Urville*. (N. and S. Pacific Oceans.)

5. **I. volans**, *Grev.?* "Frond simple, flat, obovate-lanceolate, dirty violet; disk and margins covered with short, flattish, linear branchlets, those of the margin longer."—*Mont. in Voy. au Pôle Sud*, 104.

**Lord Auckland's** group, *D'Urville*.—A solitary imperfect specimen is all that *Montagne* describes from; it is perhaps *Gigartina stiriatæ*.

## 80. CHONDRUS, Linnæus.

Frond dull red, cartilaginous, flat or compressed, ribless, flabellately dichotomously cleft; structure of three strata, innermost of dense, interlaced, longitudinal filaments, next of small roundish cells; cortical of vertical, coloured, moniliform filaments. Conceptacles containing radiating filaments, whose lower joints develop into spores, at length opening by a pore. Tetraspores in sori, immersed in the frond; there are also cavities in the substance of the frond containing minute spores.

Usually perennial *Algæ*, common in the north temperate zone.

1. **C. tuberculosus**, *Hook. f. and Harv.*;—*Fl. Antarct.* i. 188. Frond 2 in. long, cartilaginous, thick, livid, simple and broadly cuneate below, then linear and forked; margins simple or proliferous; segments spreading or divaricate, flat or channelled, broader upwards, obtuse; axils rounded. Conceptacles very numerous on the concave surface of the frond, globose, depressed at the tip, at length opening by a pore; spores minute.—*J. Ag. Sp. Alg.* ii. 248. *Nothogenia*, *Kuetzing*.

**Lord Auckland's** group, *J. D. H.*

2. **C. variolosus**, *Montagne*.—*Nothogenia*, *Fl. Antarct.* i. 188. Frond cartilaginous, compressed, 6–8 in. long, linear, red-purple, at length brown,

repeatedly dichotomous, subchannelled; segments  $\frac{1}{2}$  in. wide, ascending, flabellately fastigate, obtuse; axils rounded. Conceptacles crowded, hemispheric on both surfaces of the frond.—*Nothogenia*, Mont. in Voy. au Pôle Sud, 109. t. 10. f. 3.

**Lord Auckland's group**, *D'Urville*, *Hombrow*, etc.

### 81. **EPYMENIA**, Kuetzing.

Frond dull red-purple, caulescent below, expanding into flat forked lamina, which is ribbed at the base. Structure of 2 strata; medullary of oblong colourless cells; cortical of vertical, minute, coloured cells. Conceptacles on proper leaflets, seated on the lamina, of thick-walled hemispherical tubercles, containing a mass of spores. Tetraspores cruciate, dispersed amongst the cortical cells.

A southern genus, found in S. Africa and Australia.

1. **E. obtusa**, *Kuetzing*;—*Fl. N. Z.* ii. 249. Frond 1 foot long, stipitate, flabellately expanded, repeatedly dichotomous; principal segments cuneate below, costate halfway up; upper linear-cuneate; uppermost sub-palmate, very obtuse; disk or costa proliferous, with small leaflets  $\frac{1}{8}$ – $\frac{1}{2}$  in. long. Conceptacles numerous.—*J. Ag. Sp. Alg.* ii. 220. *Phyllophora*, Grev.;—*Fl. Antarct.* 187 and 486.

East coast, *Colenso*, *Lyall*. **Lord Auckland's group**, *J. D. H.* (S. Africa, Fuegia.)

2. **E. acuta**, *Harv. in Fl. N. Z.* ii. 249. Frond 5–6 in. high, flabelliform, cuneate at the base, many-times dichotomous, with a stout costa running up every segment to the middle; segments spreading, broadly linear, subacute.

Akaroa, *Lyall*.

### 82. **CHYLOCLADIA**, Greville.

Frond rose-red, terete or subcompressed, tubular, decomposed, nodose-articulate or constricted at regular intervals, thus divided into sacs, which are full of water, with a few filaments; walls of angular cells. Conceptacles conical, opening by a pore, enclosing cuneate spores, surrounded by a web of filaments. Tetraspores 3-partite, immersed in the walls of the frond.

A northern and southern temperate genus.

1. **C. umbellata**, *Hook. f. and Harv. Fl. N. Z.* ii. 253. t. 119 C. Fronds dull purple, 1–2 in. long, terete,  $\frac{1}{16}$  in. diameter, trichotomous; primary branches curved and hooked at the summit, emitting on the convex side below the apex, 3 or 4 erect, linear-clavate, slightly curved, lesser branches, which again throw out still smaller from their tips or are crowned with 3–4 clavate or fusiform bodies.

Port Underwood, Cook's Straits, *Lyall*.

2. **C. secunda**, *Hook. f. and Harv. Fl. N. Z.* ii. 253. Frond rose-red, small, 2 in. high, densely tufted, membranous, flaccid; branches setaceous, intricate, generally secund and arched, linear, obtuse, equal; branchlets few,

distant.—*Chrysimenia*, Harv. Ner. Austr. 77. *Dumontia pusilla*, Mont. in Voy. au Pôle Sud, 105. t. 13. f. 3.

Akaroa, *Raoul*; Port Cooper, *Lyall*. (Australia.)

3. **C. ? cæspitosa**, Harv. in *Fl. N. Z.* ii. 253. Fronds small, tufted; stipes arcuate, rooting, giving off erect, oppositely pinnate or whorled, divided branches; branchlets spindle-shaped, opposite or 4-nate, a little constricted at the base, attenuated at the apex, acute, the larger curved.

Port Nicholson, *Lyall*.—Perhaps an immature state of the Australian *C. clavellosa*.

### 83. CHRYSYMENIA, J. Agardh.

Frond more or less compressed, tubular, not articulate, full of fluid and traversed by a few filaments; walls of several series of cells; innermost long and distended; outer smaller; outermost minute. Conceptacles enclosing a dense tuft of spores. Tetraspores 3-parted, immersed in the branchlets.

A small genus, common to both temperate zones.

1. **C. ? polydactyla**, Hook. f. and Harv. *Fl. N. Z.* ii. 253. t. 119 A. Frond filiform, solid, firmly membranous, 3–4 in. long, twice as thick as a hog's bristle, excessively subdichotomously branched, dark red-purple; larger branches flexuous; smaller straight, twiggy, alternate or second, all densely clothed with alternate, second or fascicled, fusiform, hollow branchlets, which are attenuate at both ends. Fructification unknown.

Stewart's Islands, *Lyall*.—A curious and pretty little plant of doubtful affinity.

### 84. HALYMENIA, J. Agardh.

Frond bright or dark red, terete, compressed or flat, between membranous and gelatinous, dichotomous or pinnatifid; structure of 2 strata; medullary of few, lax, branched filaments in gelatine; cortical membranous, of minute coloured cellules. Spore-masses immersed in the medullary stratum. Tetraspores cruciate, scattered amongst the cortical cells.

Beautiful seaweeds, natives of both temperate zones.

1. **H. latissima**, Hook. f. and Harv. *Fl. Antarct.* t. 73. f. 1. Frond bright red, tender, between gelatinous and membranous, 2–14 in. long, 4–6 broad, cuneate at the base, broadly oblong- or ovate-lanceolate, simple or 2-fid, or margin laciniate-pinnatifid; segments ovate-lanceolate. Spore-masses extremely numerous, scattered over the whole frond, very slightly prominent.—J. Ag. Sp. Alg. ii. 204.

Lord Auckland's group and Campbell's Island: on rocks, *J. D. H.*

2. **H. novæ-Zelandiæ**, Mont. in *Voy. au Pôle Sud*, 107. t. 12. f. 2; —*Fl. N. Z.* ii. 253. Frond rose-purple, flat, between fleshy and membranous, rigid when dry, spirally convolute, dichotomously pinnate; pinnæ narrowed at the base, spreading, subterete, lanceolate, acute, quite entire, again pinnulate.—J. Ag. Sp. Alg. ii. 207. *H. Urvilleana*, Mont. l. c. t. 12, et *Phyc. Antarct.* 8.

Akaroa, *D'Urville*.—Harvey thinks that this, which is unknown to us, may possibly be his *Nemastoma Daviesii*.

### 85. PRIONITIS, J. Agardh.

Frond dark red, coarse, rigid, dense, compressed or flat, linear, without a rib, dichotomous or pinnate, proliferous on the disk or margin; structure of 3 strata; medullary broad, of densely interlaced filaments; intermediate of roundish cells; cortical of minute, coloured, vertically disposed cells. Spore-masses simple, imbedded in the substance or marginal processes of the frond, opening by a pore, enclosing roundish spores in a gelatinous pellicle. Tetraspores oblong, cruciate, scattered in the cortical layer.

A small genus, natives of the North and South Pacific.

1. **P. Colensoi**, *Hook. f. and Harv. Fl. N. Z.* ii. 254. t. 120 A. Frond rigid, dark brown, 6–8 in. long when dry,  $\frac{1}{2}$  in. broad, irregularly pinnate from the base; branches 3–4 in. long, subopposite, spreading, narrow below, dilated beyond the middle, then linear-oblong, obtuse or attenuate; margins below simple, above fimbriate or lacerate, with minute lobes, which are toothed at their dilated tips.

Cape Turnagain, on rocks, *Colenso*.

### 86. GRATELOUPIA, J. Agardh.

Frond dull purple or greenish, membranous, flexible, solid, pinnate; structure of densely woven, anastomosing, branching filaments; those of the periphery moniliform, short, densely compacted. Spore-masses globular, immersed in the periphery, opening by a pore. Tetraspores cruciate, in sub-defined sori, vertically placed amongst the peripheric filaments.

A small northern and southern temperate genus.

1. **G. ? Aucklandica**, *Mont. in Voy. au Pôle Sud*, 115. t. 10. f. 1; *Fl. Antarct.* 187. Frond 4–5 in. long, cartilaginous, filiform, terete, as thick as a sparrow-quill, vaguely excessively branched; branches and branchlets crowded and fascicled, subcompressed, narrowed at the base, obtuse, membranous, sometimes tubular, solitary or several together, springing from a curious tubercle on the frond.—*J. Ag. Sp. Alg.* ii. 185.

**Lord Auckland's** group, *D'Urville*.

### 87. NEMASTOMA, J. Agardh.

Frond dull red-purple, compressed or flattened, between fleshy and gelatinous, dichotomous or subpinnate; structure of two strata; medullary of longitudinal interwoven filaments; cortical of radiating, fastigiate, dichotomous, moniliform filaments, imbedded in gelatine. Spore-masses immersed in the cortical filaments, enclosing roundish spores, imbedded in gelatine. Tetraspores cruciate, scattered amongst the cortical filaments.

A northern and southern temperate genus.



1. **N. intestinalis**, *Harv. in Fl. N. Z. ii. 255.* Frond, delicate, red-purple, 6–8 in. long,  $\frac{1}{4}$ – $\frac{1}{8}$  broad, cylindric or compressed, tubular, linear, vaguely branched or irregularly divided into simple or forked branches, which are constricted at the base and attenuated, or 2-horned at the tip; medullary stratum very fluid. Spore-masses scattered over the whole frond, suspended below the periphery, enclosed in a dense plexus of filaments.

Preservation Harbour, on rocks, *Lyall*.

2. **N. ? attenuata**, *Harv. in Fl. N. Z. ii. 255.* Nearly related to *N. intestinalis*, but the only fragment known is larger, 15 in. long,  $\frac{1}{8}$  in. wide below, tapering upwards, compressed; medullary stratum lax.

Jackson's Bay, *Lyall*.

3. **N. pinnata**, *Hook.f. and Harv. Fl. N. Z. ii. 255. t. 120 B.* Frond soft, pale red, 4–5 in. long, and as broad in outline, undivided or forked,  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad, closely regularly set, with long, distichous, horizontal, opposite or alternate pinnæ, which are  $\frac{1}{8}$ – $\frac{1}{4}$  in. broad, attenuated to both ends; pinnæ again pinnate, with similar but much smaller ciliiform pinnales; medullary stratum compact.

Akaroa, *Lyall*. (A single specimen.)

4. **N. Daviesii**, *Harv. in Fl. N. Z. ii. 255.* Frond purple-red, between gelatinous and membranous, 6–8 in. long, stipitate, foliaceous, ovate-lanceolate,  $\frac{1}{2}$ – $\frac{1}{1\frac{1}{2}}$  in. broad, pinnate, with ovate-lanceolate lobes, 2–4 in. long and  $\frac{1}{2}$ –1 in. wide; pinnæ tapering to both ends, crisped and curled, spreading, toothed and ciliate. Spore-masses abundant, scattered over the whole frond.

Tawanga, *Davies*; Otago, *Lindsay*.

5. **N. endiviæfolia**, *Harv. in Fl. N. Z. ii. 255.* Frond cuneate at the base, excessively variable, vaguely dichotomously palmate or lacinate, narrow-linear and multifid, with acute forked tips, or broad and subpinnately branched, with dichotomous, acute or truncate, entire or toothed segments; axils rounded.

Port Nicholson and Blind Bay, *Lyall*.—Harvey thinks this so variable that it may be a form of *Daviesii*.

6. **N. prolifera**, *Harv. in Fl. N. Z. ii. 255.* Upper half of a frond, 8 in. long, cuneate, 1 in. broad, widening upwards to 2 in. then forking, gelatinous, everywhere beset on the surface and margins with filiform or cuneate-multifid leaflets, less than 1 in. long.

Akaroa, on stones, *Lyall*.

## 88. CATENELLA, Greville.

Frond dull purple, cylindric, constricted at intervals, subtubular, branched; structure of 2 strata, medullary of interlacing anastomosing filaments, passing into a cortical of vertically-placed moniliform minute filaments cohering at the periphery. Conceptacles formed in minute ovoid or subglobose branchlets. Tetraspores transversely divided, scattered through the periphery.

A genus of a single species.

**C. Opuntia**, *Grev.*;—*Fl. N. Z.* ii. 254. Roots tufted, matted, creeping. Frond  $\frac{1}{2}$ –1 in. high, sparingly branched, forming strings of oblong internodes, varying in length and breadth, terete or compressed a little.—*Harv. Phyc. Brit.* t. 88; *J. Ag. Sp. Alg.* ii. 352.

Bay of Islands, *J. D. H.* (Europe, Australia.)

## 89. DUMONTIA, Lamouroux.

Frond dull red-brown, cylindric, tubular, full of watery fluid, with a central stem and alternate simple or forked branches; walls membranous; inner surface of longitudinal filaments formed of elongated cells, outer of minute closely-packed roundish cells. Spores obovate, in minute clusters on the inner wall of the frond or in conceptacles. Tetraspores roundish, amongst the cortical cells.

A small genus of annual, often tall *Algæ*, found in both temperate zones.

1. **D. filiformis**, *Grev.*;—*Fl. N. Z.* ii. 254. Frond tender, membranous, 2–18 in. long, usually undivided, but sometimes divided from the base, narrowed at both ends, pinnated with numerous alternate long, simple, or forked branches, each like the main stem, yellow-greenish or purplish, 1 line to  $\frac{1}{2}$  in. diameter. Conceptacles scattered over the whole frond.—*Fl. Antart.* i. 189; *Harv. Phyc. Brit.* t. 95, et *Suppl.* t. 357; *J. Ag. Sp. Alg.* ii. 349.

Tidal rocks, Cape Turnagain, *Colenso*. **Campbell's** Island, *J. D. H.* (Europe, Australia.)—A very variable plant; in Europe the fronds are sometimes compressed, curved, and twisted.

2. **D. cornuta**, *Hook. f. and Harv. Fl. Antart.* i. 189. Frond tufted, 2–3 in. long, irregularly constricted here and there,  $\frac{1}{4}$  in. broad, brownish-red, naked below, above with crowded fascicled or 4-farious branches; branches spreading, forked, flexuous; branchlets recurved, ultimate attenuated at both ends with acute apices.—*J. Ag. Sp. Alg.* ii. 350.

**Campbell's** Island, *Lyall*.

3. **D. pusilla**, *Montagne in Voy. au Pôle Sud*, 105. t. 13. f. 2. Frond 1–2 in. long, cylindric, loosely branched; branches forked at the apex, clothed with short 2-nate branchlets. Tetraspores globose, scattered or arranged in lines.

On *Gigartina Ancistroclada*, Akaroa, *D'Urville*.

## 90. SPYRIDIA, Harvey.

Frond rose-red, filiform, pinnately decomposed, articulated, formed of a wide tube, coated below and at the nodes, or all over, with a layer of minute coloured cells; branches and branchlets covered with minute articulated setæ. Conceptacles naked or involucriate, terminating short branches, containing

masses of spores, each mass enclosed in a distinct membrane. Tetraspores sessile, naked on the articulated setæ.

A small genus, found in both temperate, but chiefly in tropical seas.

1. **S. opposita**, *Harv. in Fl. N. Z.* ii. 256. Root a small disk. Frond dark red, rather rigid; stem 4–6 in. long, not evidently articulate, forked at the base, compressed, 4-angled; angles prominent; branches spreading, distichously pinnate; pinnæ unequal, transparently articulate; joints short, as long as broad; pinnules few, short, pectinate, with capillary distichous or decussating ultimate branchlets. Conceptacles imperfectly 3-lobed, not involucre.—*Harv. Phyc. Austr.* iii. t. 158.

Chalky Bay, *Lyall*. (Australia, Tasmania.)

## 91. CERAMIUM, Roth.

Frond red, filiform, dichotomously branched, jointed; joints opaque, of a single cell, the nodes coated with a stratum of minute coloured cells, which sometimes extend over the whole internode. Spore-masses globular, sessile, with a pellucid limb containing angular spores, subtended by shortened (involucral) branchlets. Tetraspores external or immersed.

Annual small *Algæ*, beautiful when laid out on paper, abundant in all oceans.

§ 1. *Frond unarmed, coated at the articulations only with a zone of minute cells.*

1. **C. diaphanum**, *Roth*;—*Fl. N. Z.* ii. 256. Frond 2–4 in. long, subetaceous, dichotomously and sublaterally branched; branches erectopatent, terminal erect with converging tips; lower articulations 3–4 times longer than broad, interstices pellucid. Spore-masses lateral on the branches, with few short involucral branchlets. Tetraspores whorled round the nodes in a single series.—*Harv. Phyc. Brit.* t. 193; *J. Ag. Sp. Alg.* ii. 125.

Probably abundant, Port Cooper, Akaroa and Otago, *Lyall*. **Lord Auckland's** group, *J. D. H.* (Atlantic and Southern Oceans.)

2. **C. virgatum**, *Hook. f. and Harv. Fl. N. Z.* ii. 256. Frond erect, straight, sparingly branched; branches strict, virgate, simple or again branched; branches dichotomously multifid, appressed; tips incurved; axils very narrow; articulations of the branches as long as broad, of the branchlets very short. Spore-masses subterminal; involucre of many branchlets.—*J. Ag. Sp. Alg.* ii. 137.

East coast, parasitical on *Carpophyllum*, *Colenso*.

§ 2. *Frond unarmed; internodes more or less completely coated with small cells.*

3. **C. rubrum**, *Agardh*;—*Fl. N. Z.* ii. 256. Frond 2–12 in. long, robust, very variable in form and ramification, irregularly dichotomous; branchlets hooked inwards; lower articulations twice as long as broad, upper shorter than broad. Spore-masses globose, with 3–4 involucral branchlets or lateral branchlets. Tetraspores whorled in the articulations.—*J. Ag. Sp. Alg.* ii. 127; *Harv. Phyc. Brit.* i. 181.

Abundant throughout the islands, and in **Lord Auckland's** group and **Campbell's** Island. (Common in all temperate seas.)

4. **C. vestitum**, *Harv. in Fl. N. Z.* ii. 256. Very similar to *C. rubrum*, but articulations so coated with cells that they are scarcely visible, and the tips of the branchlets are straighter.

**Stewart's Island**, *Lyall*.—Probably a state of *C. rubrum*.

5. **C. cancellatum**, *Agardh*;—*Fl. N. Z.* ii. 226. Frond 3–6 in. high, compressed, distichously pinnate; pinnæ subcorymbose, dichotomously pinulate; terminal segments obtuse, spreading; articulations completely coated with cells, lower as long as broad. Spore-masses subterminal; involucrel branchlets elongate, divided. Tetraspores in irregular lines along the margins of the segments.—*J. Ag. Sp. Alg.* ii. 136. *Pteroceras*, *Kuetzing*.

Abundant on the coasts, *Colenso*, etc. **Lord Auckland's group**, *J. D. H.*

§ 3. *Frond with spinules, especially on the outer sides of the terminal branchlets.*

6. **C. uncinatum**, *Harv. in Fl. N. Z.* ii. 257. Frond capillary, regularly diehotomously fastigiate; axils patent; tips incurved; articulations not coated with cells, lower 3–4 times longer than broad; nodes swollen, armed with a long and a short uncinat spinule.

Cape Turnagain, *Colenso*; Cook's Straits, *Lyall*.

## 92. CENTRO CERAS, Kuetzing.

Frond red, filiform, branched, jointed; joints of a single cell, coated with oblong longitudinal cellules, placed in longitudinal series. Fructification of *Ceramium*.

A genus of one variable species, abounding in the Atlantic and Pacific Oceans, differing from *Ceramium* in the longitudinal cortical cells.

1. **C. clavulatum**, *Mont.*;—*Fl. N. Z.* ii. 257. Frond densely tufted, dark red, very variable, 2–4 in. long, rather rigid, capillary, dichotomously branched; nodes swollen, their bases sunk in the top of that below them, when young crowned by minute spinous processes; young plants covered with deciduous hairs.—*J. Ag. Sp. Alg.* ii. 143; *Harv. Ner. Bor. Am.* 211. t. 33 C.

Common on all the coasts, *Colenso*, etc. (Tasmania, and common in tropical and sub-tropical seas.)

## 93. PTILOTA, Agardh.

Frond bright or dull red, linear, slender, compressed, 2-edged, distichously branched, pectinate-pinnate; pinnules sometimes articulate; axis of one long articulate tube, more or less coated with many series of small cells. Spore-masses involucrel, full of angular spores, the involucre of many incurved branchlets. Tetraspores sessile or stalked, 3-partite, solitary or crowded on the pinnules.

A beautiful genus, common in both temperate zones, but more abundant and larger in the southern.

1. **P. formosissima**, *Mont. in Voy. au Pôle Sud*, 97. t. 9. f. 3;—*Fl. N. Z.* ii. 257. Frond bright red, cartilaginous, 6–16 in. long, and as broad



in outline, flabellate, 2-edged,  $\frac{1}{12}$ – $\frac{1}{6}$  in. broad, decompoundly pinnate; pinnæ alternate; pinnules pinnatifid, ultimate serrate or pectinate. Spore-masses sessile, with 4 pectinate involucreal branchlets. Tetraspores marginal, pedicelled, globose.—*Fl. Antarct.* 190. t. 77; *J. Ag. Sp. Alg.* ii. 102. *Euptilota*, Kuetzing.

Throughout the islands, and in **Lord Auckland's** group, abundant.

2. **P. pellucida**, *Harv. in Fl. N. Z.* ii. 257. Frond bright rosy-red, 2–3 in. long, ovate in outline, filiform, distichously decompound, primary branches 2–3-pinnate, not coated with cells above; pinnæ articulate, opposite, unequal, one undivided, the other pinnate or pectinate on one side; ultimate branchlets filiform, constricted at the base, subacute; articulations  $1\frac{1}{2}$ –2 times as long as broad.

Otago and Stewart's Island, *Lyall*.—Harvey suggests the possibility of this being the same as the *Callotamnion Ptilota*, *Fl. Antarct.* t. 189, found off the Crozet Islands.

#### 94. **GRIFFITHSIA**, Agardh.

Frond rose-red, filiform, dichotomously branched, articulate, of one tube; branchlets often whorled; nodes transparent. Spore-masses involucreate, enclosing numerous angular spores. Tetraspores globose, 3-parted, involucreate.

A considerable genus, found in both temperate zones.

1. **G. setacea**, *Agardh*;—*Fl. N. Z.* ii. 258. Frond 3–6 in. long, setaceous, rather rigid, straight, irregularly dichotomous, crimson; axils acute; branchlets sometimes opposite; articulations cylindric, 5–6 times longer than broad; involucre lateral, pedicelled.—*Harv. Phyc. Brit.* t. 184; *J. Ag. Sp. Alg.* ii. 84.

East coast, *Colenso*; Foveaux Straits, *Lyall*.—A state with more slender branches and longer articulations has been found at Bluff Harbour and Port Cooper, *Lyall*. (N. and S. temperate oceans.)—A beautiful plant, stains paper crimson; when put in fresh water the articulations burst with a crackling noise, and discharge the red colour.

2. **G. antarctica**, *Hook. f. and Harv. Fl. Antarct.* ii. 488;—*Fl. N. Z.* ii. 258. Frond tufted, flaccid, stout, dichotomous; branches elongate, erect, and branchlets often secund, naked, constricted at the nodes; articulations of the branches 4–6 times, of the branchlets about 3 times longer than broad; fruiting branchlets lateral, short, crowned with an umbellate involucre.—*J. Ag. Sp. Alg.* ii. 87.

East coast, *Colenso*; Foveaux Straits and Stewart's Island, *Lyall*. (Tasmania.)

#### 95. **BALLIA**, Harvey.

Frond bright or rose-red, fading to green or dirty brown, filiform, rigid, dendroid; stem and branches covered with short capillary fibres; branchlets pellucid, pinnately decompound, or pectinately pinnate. Spore-masses enclosed in an involucre of many incurved filiform branchlets, containing numerous angular spores. Tetraspores on the short capillary fibres of the branches.

A small genus of beautiful plants.

1. **B. callitricha**, *Mont.*;—*Fl. N. Z.* ii. 257. Root a spongy disk. Fronds densely tufted, 2–10 in. long, with a stout rigid woolly stipes, setaceous above, rose-purple, 3–4-pinnate; pinnae and pinnules capillary; branches opposite, very close-set, plumosely decomposed, lanceolate in outline, ultimate undivided, subulate, very acute; articulations ovoid or cylindric, about twice as long as broad.—*J. Ag.*; *Fl. Sp. Alg.* ii. 75. *B. Brunonis*, *Harv. Fl. Antarct.* 182. *B. Hombroniana*, *Mont.* in *Voy. au Pôle Sud*, t. 12. f. 1. *Sphacelaria callitricha*, *Agardh.*

Abundant throughout the islands, and in **Lord Auckland's** group and **Campbell's** Island. (All the southern temperate oceans.)

2. **B. scoparia**, *Harv. Phyc. Austr.* iii. 168.—*Callithamnion*, *Fl. N. Z.* ii. 259. Habit and woolly root and stipes of *B. callitricha*, but dull in colour, most densely fastigiately branched, the branches springing from all sides; branches pinnately branched.—*Callithamnion*, *Fl. Antarct.* t. 189. f. 3; *J. Ag. Sp. Alg.* ii. 35. *Phlebothamnion*, *Kuetzing.*

East coast, *Colenso*; Preservation Harbour and Foveaux Straits, *Lyall.* (Fuegia, Falkland Islands, Australia.)

## 96. CALLITHAMNION, Lyngbye.

Frond rose-red or purplish, filiform or capillary, branched, articulate, of one series of long tubular cells, those of the stem sometimes coated by decurrent cells, the branches always of single articulate tubes, pellucid at the nodes. Spore-masses solitary or geminate, axillary or lateral, containing numerous angular spores. Tetraspores sessile or stalked on the branchlets.

A large genus, found in all seas.

§ 1. *Frond short, densely tufted, excessively branched from the base, with no distinct stem; articulations without cortical cells.*

1. **C. Rothii**, *Lyngb.*;—*Fl. N. Z.* ii. 260. Frond deep red or purple,  $\frac{1}{4}$ –1 in. high, densely tufted; filaments excessively slender, short, erect, dichotomous; branches few, long, straight, equal, alternate or dichotomous; articulations twice as long as broad. Tetraspores clustered on short terminal subcorymbose branchlets.—*Harv. Phyc. Brit.* t. 120 B; *J. Ag. Sp. Alg.* ii. 17.

Tidal rocks, caverns, etc., probably common, Hawke's Bay and Cape Kidnapper, *Colenso.* (N. Atlantic Ocean.)

§ 2. *Frond pinnate; pinnules (upper or all) opposite.*

2. **C. flaccidum**, *Hook. f. and Harv. Fl. N. Z.* ii. 258. Fronds flaccid, membranous, rosy, 2–4 in. long, loosely branched, excessively slender; branches densely crowded, opposite and alternate, pinnate; pinnules all opposite or alternate, short, simple, sometimes secund, incurved; primary articulations many times, secondary 6–10 times longer than broad. Tetraspores numerous, secund on the pinnules.—*Fl. Antarct.* 490. t. 188. f. 1; *J. Ag. Sp. Alg.* ii. 31.

Otago Harbour, *Lyall.* (Fuegia, Tasmania.)

3. **C. Plumula**, *Lyngb.*;—*Fl. N. Z.* ii. 258. Frond flaccid, rose-red, 2–5 in. long, distichously branched; branches alternate or irregular, slender, each node with a pair of opposite horizontal or recurved pectinate branchlets, the segments of which in luxuriant specimens are sometimes again pectinate; articulations 3–4 times as long as broad. Tetraspores on the pectinate branchlets.

D'Urville's Island, *Lyall*. (Atlantic Ocean, Tasmania, Fuegia.)

4. **C. applicitum**, *Harv. in Fl. N. Z.* ii. 258. Frond minute,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, rose-red, capillary, prostrate, attached by its whole length, distichously pinnately branched; branches pinnate or 2-pinnate; pinnæ all opposite, close-set; articulations of branches cylindric, 3–4 times as long as broad, of the pinnæ hexagonal, of the pinnules square.

Creeping on *Amphiroa*, *Colenso*.

5. **C. pectinatum**, *Mont. in Voy. au Pôle Sud*, 90;—*Fl. Antarct.* 191. Habit and size of *C. applicitum*, or even smaller; pinnæ horizontal; pinnules few, 5–6, very short, simple or nearly so; articulations terete, primary twice as long as broad. Tetraspores axillary or at the base of the pinnules.

**Lord Auckland's** group, on *Algæ*, *D'Urville*.

§ 3. *Frond pinnate throughout or above; pinnules alternate.*

\* *Internodes without a coating of small cells (or lowest coated at the base only in C. puniceum, brachygonum, and byssoideum).*

6. **C. hirtum**, *Hook. f. and Harv. Fl. Antarct.* 192. t. 78. f. 2;—*Fl. N. Z.* ii. 258. Fronds tufted, blackish or dark brown, stout, intricate, 2–3 in. long, 4-fariously branched, densely clothed throughout with 4-farious branchlets; primary branches robust, veined below, jointed above; secondary elongate; pinnules simple, incurved, obtuse; articulations  $1\frac{1}{2}$  as long as broad.—*J. Ag. Sp. Alg.* ii. 53.

Various places, in the **Middle** Island, probably common, *Lyall*. **Lord Auckland's** group, *J. D. H.*

7. **C. gracile**, *Hook. f. and Harv. Fl. Antarct.* 191. t. 78. f. 1. Frond excessively slender, rose-red, erect from a branched creeping rhizome, laxly 2–3-pinnate; pinnæ opposite and alternate, elongate, branched; pinnules short, erecto-patent, alternate, simple or branched at the tip; primary articulations pellucid, 4–5 times as long as broad. Tetraspores minute, spherical.—*J. Ag. Sp. Alg.* ii. 48.

**Campbell's** Island, *J. D. H.*

8. **C. cryptopterum**, *Kuetzing, Sp. Alg.* 646.—*C. micropterum*, *Hook. f. and Harv. Fl. Antarct.* 192 (not of Montagne). Frond small, rose-red, from a scutate root, erect,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, sparingly distichously and alternately divided, obovate in outline, 2–3-pinnate; pinnæ flexuous, alternately multifid; pinnules erecto-patent, obtuse; internodes pellucid, 2–3 times longer than broad. Tetraspores minute, scattered, elliptic, appressed.—*J. Ag. Sp. Alg.* ii. 55.

**Lord Auckland's** group, *J. D. H.*

9. **C. puniceum**, *Harv. in Fl. N. Z.* ii. 259. Frond fine lake-purple,

2-3 in. long, tender, excessively branched, inextricable; stem and branches decompoundly pinnate; upper divisions pinnate; pinnules subulate, acute; primary articulations pellucid, veined, 8-10 times, of the branchlets 3-4 times longer than broad; lower only coated with small cells. Tetraspores solitary, lateral.

Tauranga, *Davies*.

10. **C. brachygonum**, *Harv. in Fl. N. Z.* ii. 259. Frond flaccid, capillary, carmine-red, densely tufted, 1-2 in. high. Stem subsimple, set on all sides with virgate branches, which again branch and bear distichous, dense, plumose pinnæ; plumules narrow, erecto-patent; lower pinnate; upper longer and more compound; middle one long and 2-pinnate; articulations short, thick-walled; lowest sparingly coated with cells. Tetraspores globose, in series on the inner faces of the branchlets.

Blind Bay, *Lyall*; Tauranga, *Davies*.

11. **C. byssoideum**, *Arnott*;—*Fl. N. Z.* ii. 260. Frond flaccid, gelatinous, capillary, much divided into inextricable branched filaments, or with a few stems thicker than the rest; branches linear-lanceolate, set with long, slender, flexuous, pinnate plumules; articulations pellucid, of the stouter stems veined, 8 times as long as broad, of the branchlets 4 times. Tetraspores elliptic, subsolitary near the bases of the branchlets.—*Harv. Phyc. Brit.* t. 262; *J. Ag. Sp. Alg.* ii. 40. *Phlebothamnium*, *Kuetzing*.

Foveaux Straits and Otago Harbour, *Lyall*; Maketu, *Chapman*. (N. Australia.)

\*\* *Internodes coated with small cells.*

12. **C. Colensoi**, *Harv. in Fl. N. Z.* ii. 259. Frond dark purple, robust, dendroid, 2-3 in. high; main stem as thick as a sparrow's quill below, laterally branched; branches densely clothed all round with minute, compound, squarrose, imbricate branchlets; ultimate divaricate, subulate, acute, alternate; articulations coated with small cells,  $1\frac{1}{2}$  times longer than broad; ultimate pellucid.

East coast and Hawke's Bay, *Colenso*.

13. **C. consanguineum**, *Harv. in Fl. N. Z.* ii. 259. Frond densely tufted, flaccid, rose-purple, 2-3 in. high, capillary, excessively branched; branches spreading, the smaller distichous upwards, alternately decompoundly pinnate and alternately plumulate; plumules short, flabellate, naked below, pinnate above, terminal; pinnæ close-set; articulations opaque, with cortical cells, 2-3 times as long as broad; upper pellucid. Tetraspores lateral, subsolitary, triangularly divided.

Port Nicholson, *Lyall*.

### SUBORDER III. **CHLOROSPERMEÆ.**

#### 97. **CAULERPA**, Lamouroux.

Rhizome prostrate, creeping, throwing up erect green branches (fronds) of horny-membranous texture. Structure continuously tubular, filled with a



spongy network of anastomosing fibres and grumous fluid. Fructification unknown.

A fine genus, most abundant in tropical seas; the species are often much branched, like Pine-branches, or pinnate, like Mosses.

1. **C. sedoides**, *Agardh*;—*Fl. N. Z.* ii. 261. Rhizome slender, glabrous, matted, glossy, several in. long,  $\frac{1}{16}$ – $\frac{1}{10}$  in. diameter. Fronds crowded, 2–6 in. high, linear, clothed throughout their length with short, pyriform, loosely imbricate, more or less distichous, opposite sacs,  $\frac{1}{12}$ – $\frac{1}{6}$  in. long.—*Harv. Ner. Austr.* ii. t. 72. *Chauvinia*, Kuetzing. *Ahnfeldtia*, Trev.

Rocks near low-water mark, *Colenso*; Cook's Straits, *Lyall*. (Australia, Mauritius, Indian Ocean.)

2. **C. hypnoides**, *Agardh*;—*Fl. N. Z.* ii. 260. Rhizome robust,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diameter, covered with cylindric, dichotomous scales. Frond bright green, erect, stalked, lanceolate, 8–12 in. high, pinnate; stipes, rachis, and pinna densely clothed with very short, forked, subulate branchlets; pinnæ distichous, simple or forked, 1–2 in. long, close-set, patent.—*Harv. Ner. Austr.* ii. t. 84. *Chauvinia*, Kuetzing.

Deep tide-pools, East coast, *Colenso*. (Australia, Tasmania.)

3. **C. Brownii**, *Endlicher*;—*Fl. N. Z.* ii. 260. t. 121 A. Rhizome stout, clothed with cylindric scales. Frond green, erect, 10–12 in. high, slender, branched, clothed throughout with erecto-patent, 4-fariously, loosely imbricate, curved, cylindrical, slender, simple, acute, mucronulate or obtuse processes  $\frac{1}{8}$  in. long.

East coast, *Colenso*; Chalky and Lyall's Bay, *Lyall*. (Tasmania and Australia.)

4. **C. furcifolia**, *Hook. f. and Harv. Fl. N. Z.* ii. 260. t. 121 B. Rhizome as in *C. Brownii*. Frond slender, 4–6 in. high, clothed throughout with suberect, 4-fariously imbricate, curved, forked (rarely simple), cylindrical, slender, acute processes.—*C. Selago*, *Hook. f. and Harv. in Lond. Journ. Bot.* iv. 550, not of *Agardh*.

East coast, *Colenso*. (Tasmania.)

5. **C. articulata**, *Harv. in Fl. N. Z.* ii. 261. Rhizome unknown. Branches slender, filiform, 4–5 in. long, bright green, simple or forked, constricted at intervals of  $\frac{7}{12}$ – $\frac{1}{6}$  in., clothed throughout with distichous branchlets, which are opposite, attached to the middle of each internode,  $\frac{1}{2}$  in. long, cylindric, obtuse, constricted at the base.

East coast, rare, *Colenso*.

## 98. CODIUM, Stackhouse.

Frond dark green, sponge-like, consisting of a matted mass of 1-celled branching tubuli, filled with semifluid endochrome. Fructification of lateral vesicles on the branchlets at the circumference, containing myriads of antherozoids.

Natives of both temperate and tropical zones.

1. **C. tomentosum**, *Agardh*;—*Fl. N. Z.* ii. 261. Frond from a spongy base, cylindric, 6–12 in. long,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diameter, cylindric, dichotomous or palmatipartite.—Harv. Phyc. Brit. t. 93.

Probably abundant, East coast, *Colenso*; Tauranga, *Davies*; Port Nicholson, *Lyall*.  
**Lord Auckland's** group, *J. D. H.* (Abundant in all seas.)

2. **C. adhærens**, *Agardh*;—*Fl. N. Z.* ii. 261. Frond forming green velvety patches, 1 in. to 1 ft. broad, on rocks; substance gelatinous, dense.—Harv. Phyc. Brit. t. 35 A.

Banks' Peninsula, *Lyall*; Cape Kidnapper, *Colenso*. (Generally diffused in warmer seas, but not hitherto found in Australia.)

### 99. VAUCHERIA, De Candolle.

Frond bright green, tufted, capillary, cylindric, tubular, full of a green granular mass. Fructification globose or oblong stalked bodies (spores), full of green matter, attached to the surface of the frond.

Usually annual freshwater *Algæ*, always small.

1. **V. Dilwynii**, *Agardh*;—*Fl. N. Z.* ii. 195. Frond decumbent, irregularly branched, farinose when highly magnified, minutely tubercled. Spores globose, sessile, solitary.—Grev. Alg. Brit. t. 19.

Damp ground, *Colenso*. (Europe, Kerguelen's Land, etc.)

*Colenso* and *Lyall* send fragments of other species of this genus, but these cannot be determined except in a fresh state.

### 100. BRYOPSIS, Lamouroux.

Frond bright or yellow-green, filiform, tubular, membranous, cylindric, glistening, branched; branches imbricate or distichously pinnate, full of green granuliferous fluid.

Small annual *Algæ*, found in all seas.

1. **B. plumosa**, *Agardh*;—*Fl. N. Z.* ii. 195. Frond glossy green, feathery, lubricous, 1–4 in. high, more or less branched or simple; branches naked below, above pinnate, with subopposite, slender, distichous branchlets.—Harv. Phyc. Brit. t. 111.

Tidal pools, probably common, Cook's Straits, Akaroa, and Otago Harbour, *Lyall*. (N. Atlantic, Australia.)

### 101. PORPHYRA, J. Agardh.

Frond pink or green-purple, flat, membranous, leaf-like, without midrib. Fructification red or purple. Spores arranged in fours, dispersed over the whole frond.

A considerable genus, found in all seas.

1. **P. laciniata**, *Agardh*;—*Fl. N. Z.* ii. 264. Fronds clustered, 4–18 in. long, fixed by the base or centre, glossy, fine purple, deeply and irregularly cleft; margin cut and lobed.—*Harv. Phyc. Brit.* t. 92.

Common on rocks and stones in the sea (all latitudes).—This is much used as “Laver,” in England, in scrophulous cases.

2. **P. vulgaris**, *Agardh*;—*Fl. N. Z.* ii. 264. Frond 1–2 ft. long, simple, lanceolate, often much waved, undivided.—*Harv. Phyc. Brit.* t. 211.

With the last and probably not different from it.

3. **P. capensis**, *Kuetzing*;—*Fl. Antart.* 193. Frond tufted, small, violet-purple, orbicular, crisped and undulate, 1–2 in. broad.—*P. Columbina*, *Mont.* in *Voy. au Pôle Sud*, 33.

**Lord Auckland's** group and **Campbell's** Island, *D'Urville, J. D. H.* (S. Africa, etc.)

## 102. **ULVA**, Linn.

Frond bright green, flat, membranous, leaf-like, without midrib, sometimes inflated or saccate when young. Fructification of green spores, arranged in fours, dispersed over the whole frond.

Perhaps the commonest marine plants in the world, annual; the species are probably all forms of one.

1. **U. latissima**, *Linn.*;—*Fl. N. Z.* ii. 265. Frond tufted, 6–18 in. long, delicately membranous, pale green, broadly obovate or oblong, flat, or variously lobed or waved.—*Harv. Phyc. Brit.* 171.

Abundant on the shore everywhere, as far south as **Campbell's** Island. (All seas.)

2. **U. rigida**, *Agardh*;—*Fl. N. Z.* ii. 265. Frond subcartilaginous, contracted to a flat thickish stipes, deeply lobed; lobes curved, undulate; cells subquadrate, orbicular.—*Phycoseris rigida* and *lobata*, *Kuetzing*.

East coast, *Colenso*. (Atlantic, Chili, etc.)

3. **U. crispa**, *Lightf.*;—*Fl. N. Z.* ii. 265. Fronds forming an irregular stratum, short, crisped and plaited.—*Fl. Antart.* 498. *Prasiola crispa* and *antarctica*, *Kuetzing*.

Probably common on damp ground near the sea. (Europe, etc.)

4. **U. bullosa**?, *Roth*;—*Fl. N. Z.* ii. 265. Fronds forming green strata, small, obovate and saccate when young, at length breaking up into ragged bullate laminæ.—*Kuetzing*, *Tab. Phyc.* t. 28. f. 1.

On stones, under water, *Colenso*.—Specimens young, and perhaps not referable to this species. (Europe, etc.)

---

*U. reticulata*, *Forst.*, a tropical species, found in the Red Sea, Sumatra, etc., is mentioned by *Montagne* (*Voy. au Pôle Sud*; *Bot. Crypt.* 33) as a native of **Lord Auckland's** group, but I suspect some mistake; it may be recognized by its flat perforated frond divided into linear-reticulated lobes.

103. **ENTEROMORPHA**, Link.

Frond green, tubular, hollow, cylindric or compressed, usually branched; structure reticulated. Fructification of roundish spores in threes or fours, clustered in the reticulations.

An excessively common genus of annual *Algæ*, found in all seas, and in brackish water also. The two first species appear to pass into one another, and often to be difficult to distinguish from *Ulva*.

1. **E. compressa**, Grev.;—*Fl. N. Z.* ii. 264. Frond very variable, 6–12 in. long, elongate; branches cylindrical or compressed, firm, capillary 2– $\frac{1}{4}$  in. diameter; branches simple or nearly so, attenuated at the base, obtuse.—Harv. Phyc. Brit. t. 335.

Abundant on the seashores. (Common in all seas.)

2. **E. intestinalis**, Grev.;—*Fl. N. Z.* ii. 264. Frond 2 feet and more long,  $\frac{1}{2}$ –3 in. diameter, simple, tapering downwards, inflated, often floating, often waved and curled, full of green-coloured fluid, fading to yellow and white.—Harv. Phyc. Brit. t. 154.

Abundant on seashores, with *E. compressa*. (Common to all seas.)

3. **E. clathrata**, Grev.—Var. *ramulosa*, *Fl. N. Z.* ii. 265. Frond 5 in. to 2 feet long, very slender, much branched, highly reticulated, curled and twisted, forming a dense interwoven mat, beset on all sides with short spine-like branchlets, hence harsh to the touch.—*E. ramulosa*, Smith; Harv. Phyc. Brit. t. 245.

Var. *erecta*. Branches all attenuated to a fine point.—*E. erecta*, Harv. Phyc. Brit. t. 43. *Zignoæ*, Trevis; Mont. in Voy. au Pôle Sud, t. 30.

Var. *ramulosa*, Otago Harbour, *Lyall*. Var. *erecta*, **Lord Auckland's** group, *D'Urville*. (Europe, etc.)

104. **BANGIA**, Lyngbye.

Frond generally pink or purple, capillary, tubular, simple or branched, of numerous radiating cells in transverse rows, enclosed in a hyaline sheath. Fructification of purple or green spores, one in each cell of the frond.

A considerable genus of very small fresh- and salt-water *Algæ*, often forming a scum or stratum on rocks, walls, etc.

1. **B. ciliaris**, *Carmichael*;—*Fl. N. Z.* ii. 264. Filaments minute, simple, straight,  $\frac{1}{2}$  in. long, variable in breadth, compressed, purple, sometimes expanding and leafy in the middle; cells in 2 rows except where expanded, globular.—Harv. Phyc. Brit. t. 322.

Parasitic on leaves of *Zostera*, Cook's Straits, *Lyall*. (Europe, also on *Zostera*.)

2. **B. lanuginosa**, *Harv. in Fl. N. Z.* ii. 264. Filaments curved, cylindric, bright purple, soft, gelatinous, of one series of lenticular cells, which are shorter than broad.

Parasitic on *Chordaria*, *Colenso*.



105. **BATRACHOSPERMUM**, Roth.

Fronde immersed in gelatine, filiform, branched, usually moniliform and nodose, longitudinally striate, composed of colourless jointed filaments agglutinated together, beset with distant whorls of moniliform branchlets. Spores in globular masses seated on the whorls.

Delicate filamentous freshwater *Algæ*, growing in subalpine lakes and running streams.

1. **B. moniliforme**, Roth;—*Fl. N. Z.* ii. 261. Vaguely branched, variously coloured (green purple violet brown or blackish); nodes moniliform, distinct, globose, those of the branches confluent.—Kuetz. Sp. Alg. 535.—*Conferva gelatinosa*, Linn.; Dillwyn, *Conferv.* t. 32.

Freshwater streams, probably common, *Colenso*; Canterbury, *Lyall*. (Europe, Africa, America.)

106. **CLADOPHORA**, Kuetzing.

Fronde green, filiform, dichotomously branched, articulate, uniform throughout; articulations of single long or short tubes, filled with granular endochrome, that at maturity developes antherozoids.

A large and widely-diffused genus.

§ 1. *Filaments forming dense intricately-matted masses.*

1. **C. herpestica**, Kuetzing;—*Fl. N. Z.* ii. 262. Filaments tufted, creeping, ultra-setaceous, bladder-like, rigid, irregularly branched; uppermost branches fascicled; articulations about 15 times longer than broad.—*Conferva*, Mont. in *Voy. au Pôle Sud*, 6.

Sandy soil, Bay of Islands, *Hombron*, *J. D. H.*; Cape Kidnapper, *Colenso*.

2. **C. Lyallii**, *Harv.* in *Fl. N. Z.* ii. 262. t. 121 C. Filaments pale yellow-green, forming dense wide-spreading matted tufts, stout, rigid, decumbent below, then erect,  $\frac{1}{4}$ – $\frac{2}{3}$  in. long, very irregularly branched; branches spreading, second or opposite or alternate; branchlets few, 3–4 articulations, which are constricted at the nodes, and  $1\frac{1}{2}$  times as long as broad.

Stewart's Island, *Lyall*.

3. **C. pacifica**, Kuetzing.—*Conferva*, Mont. in *Voy. au Pôle Sud*, 7. t. 14. f. 2; *Fl. Antarct.* 192. Filaments 1–2 in. high, dull green, olive-green below, forming an intricate spongy compact mass, capillary, rigid, excessively branched; branches erect, lower simple, upper dichotomous; branchlets sub-second, acute, spiniform, straight or hooked; articulations as long or twice as long as broad.

**Lord Auckland's group**, *D'Urville*, *Hombron*. Unknown to us.

§ 2. *Filaments tufted, but not forming spreading matted masses, more or less regularly branched.*

4. **C. pellucida**, Kuetzing;—*Fl. N. Z.* ii. 262. Filaments bright green, a span long and under, firm, subcartilaginous, long, simple and naked below, above branched; branches opposite alternate or whorled, uppermost

fascicled; primary articulations 8–16 times, of the branches 8–10 times, of the branchlets 4–8 times longer than broad.—Harv. Phyc. Brit. t. 174.—*C. catenifera*, Kuetz. l. c.

Waitemata Harbour, *Lyall*. (Europe, Australia, S. Africa.)

5. **C. verticillata**, *Hook. f. and Harv. Fl. Antarct.* i. 193. Filaments 3–8 in. long, tufted, rigid, setaceous, very slender, straight, sparingly divided; lateral branches elongate, simple, naked, erect, fastigiate, opposite or 3–4-nate, slightly dilated at the tips; primary articulations 6–8 times longer than broad, upper as long or twice as long as broad.—Kuetz. Sp. Alg. 388.

Port William, in a cave, *Lyall*. **Lord Auckland's** group, *J. D. H.*

6. **C. Colensoi**, *Harv. in Fl. N. Z.* ii. 262. Filaments not densely tufted, dark green, slender, flexuous, sparingly decompound from the base; branches slender, curved, flexuous, naked below, above with short second very erect appressed branchlets; articulations 3–4 times longer than broad, full of green matter, cylindric, not contracted at the nodes, uniform throughout.

Hawke's Bay, *Colenso*, rare.

7. **C. Daviesii**, *Harv. in Fl. N. Z.* ii. 263. Filaments 4–5 in. long, bright green, densely tufted, rigid, stout, much branched; branches alternate, usually naked below; axils very broad and rounded, above with short crowded subcorymbose generally second branchlets of 2 or 3 articulations, the latter seldom twice as long as broad, uniform throughout the frond.

Tauranga, *Colenso*.

8. **C. gracilis**, *Griffiths*;—*Fl. N. Z.* ii. 263. Filaments 10–15 in. long, pale green, very slender, much branched; branches erecto-patent, stout, flexuous; branchlets second, pectinate, elongate, slender, of many articulations, subtomentose; articulations 2–4 times as long as broad, contracted at the nodes.—Kuetzing, Sp. Alg. 403; Harv. Phyc. Brit. t. 18.

Port William, *Lyall*. (Europe, Tasmania.)

9. **C. crinalis**, *Harv. in Fl. N. Z.* ii. 263. Filaments densely tufted below, deep green, 1–2 in. high, slender, rigid, shining when dry, decompound, but not much branched; branches and branchlets few, scattered, short or long, very straight and erect, obtuse; articulations 4–8 times longer than broad, upper shorter, constricted at the nodes.

**New Zealand**, *Colenso*.

10. **C. virgata**, *Kuetzing*.—*Conferva*, Agardh;—*Fl. Antarct.* 192. Filaments excessively branched below; branches elongate, fastigiate, ultra-setaceous, distinctly dilated at the tips; lower articulations 2–4 times longer than broad, upper about equal, collapsed when dry.

**Lord Auckland's** group, *D'Urville*. (S. Africa.)

## 107. CONFERVA, Linn.

Frond of green, slender, jointed filaments; joints of a single cell, floating or attached. Fructification of clusters of antherozoids contained in the joints.

A large salt and freshwater genus, abundant in all climates.

1. **C. Darwinii**, Kuetz. *Sp. Alg.* 380.—*Chætomorpha*, Fl. N. Z. ii. 263. Frond 2–8 in. long, very stout, gradually dilated upwards; articulations often geminate; lower rather longer than broad; upper shorter,  $\frac{1}{5}$  in. broad, constricted at the nodes.—*C. clavata*, var. *Darwinii*, Fl. Antarct. 493. t. 192. f. 1.

East coast, *Lyall*, *Colenso*; Otago, *Lindsay*. (Tasmania, Fuegia?)

2. **C. ærea**, *Dillwyn*, *Conf.* t. 80;—*Fl. N. Z.* ii. 263. Filaments numerous, erect, pale green below, paler above, gradually dilated upwards; lowest articulation longest, 5 times as long as broad, the middle ones half as long; uppermost as long as broad.—Harv. *Phyc. Brit.* t. 99 B. *Chætomorpha*, Kuetz. *Sp. Alg.* 379.

Houraki Gulf, *Lyall*. (Australia, Europe.)

3. **C. valida**, *Hook. f. and Harv. Fl. N. Z.* ii. 263. Filaments pale green, loosely matted, flaccid; articulations  $1\frac{1}{2}$ –3 times as long as broad, contracted at the nodes. *Chætomorpha*, Kuetz. *Sp. Alg.* 379.

Port William, *Lyall*. (Tasmania.)

## 108. TYNDARIDEA, Bory.

Filaments simple, green-yellow or brown, finally inosculating by transverse tubes. Endochrome of subglobular masses, which, after conjugation, unite and form a roundish globule lodged in one of the articulations, or in the connecting tube.

In streams, pools, ditches, and wet places, often forming spreading masses of coloured scum.

1. **T. anomala**, *Ralfs*;—*Fl. N. Z.* ii. 263. Joints equal or shorter than long, constricted here and there. Cell-wall often very thick.—*E. Bot. Suppl.* t. 2899; Hassall, *Brit. Freshwater Alg.* t. 38. f. 2, 3. *Zygogonium*, Kuetz. *Sp. Alg.* 447.

Freshwater, *Colenso*. (Europe.)—Apparently the same as the British plant, but impossible to determine from comparison of dried specimens.

2. **T. ? byssoidea**, *Harv. in Fl. N. Z.* ii. 264. Filaments blackish, gelatinous, arachnoid, greenish under the microscope; articulations about 3 times as long as broad.

Freshwater lake, Kapiti, Cook's Straits, *Lyall*.

## 109. CALOTHRIX, Agardh.

Frond of capillary, green internally, short, tufted or fascicled, rather rigid filaments, fixed, without a mucous coat, and without a waving motion in water; tube continuous, transversely closely striated, at length dissolving into lenticular sporules.

Fresh- and salt-water small *Algæ*.

1. **C. scopulorum**, *Weber and Mohr*;—*Fl. N. Z.* ii. 265. Filaments  $\frac{1}{10}$  in. long, minute, erect, curved, flexuous, simple, forming a continuous, dirty-green, velvety stratum, attenuated to the point, slimy at the base, indistinctly striate.—*Harv. Phyc. Brit.* t. 58 B.

Mud and rocks near high-water mark, *Colenso*. (Widely diffused.)

### 110. OSCILLATORIA, Vaucher.

Frond of capillary interlacing filaments floating in mucus; filaments simple, continuous, presenting a curious oscillating motion under the microscope; tube transversely closely striated.

A large genus, abounding chiefly in fresh water, forming green or coloured slimy masses on moist rocks etc., and a scum on ponds, etc.

Species of this genus are no doubt as common in New Zealand as in Europe and everywhere, but they cannot be determined except in a fresh state. Fragments of several have been collected by *Colenso*, *Lyall*, and others.

### 111. TOLYPOTHRIX, Kuetzing.

Frond of free capillary filaments, articulate at the base; branches fascicled or radiating, not opposite. Sheaths hyaline, open at the apex.

A considerable European freshwater genus, probably found all over the globe.

1. **T. irregularis**, *Berk. in Fl. N. Z.* ii. 265. Filaments verdigris-green, irregular,  $\frac{1}{2000}$ — $\frac{1}{2500}$  in. diameter, compressed, sometimes constricted or torulose, often attenuated above and below, furnished at the base with a minute, hyaline, elliptic connecting joint; rings very narrow.

Tidal mud, amongst patches of *Vaucheria*, *Colenso*.

### 112. NOSTOC, Vaucher.

Frond gelatinous or coriaceous, dull green or brownish, amorphous, traversed by moniliform filaments, which finally break up as spores.

Gregarious *Algæ*, forming jelly-like masses on the damp ground, moss, rocks, and sometimes in water, often resembling *Collema*s.

1. **N. verrucosum**, *Vaucher*;—*Fl. N. Z.* ii. 266. Frond  $\frac{1}{2}$ –1 in. across, gregarious, confluent, subglobose, plaited, blackish green, at length hollow filaments short, curled, fragile.—*Agardh, Syst. Alg.* 21.

Canterbury plains, in freshwater streams, *Lyall*. (Europe, etc.)

### 113. ACHNANTHES, Bory.

Frond like a little flag, rectangular, attached to a short or long stipes by one corner, composed of a few frustules, which separate without cohering at the angles.

Very minute *Algæ*, parasitic, like minute flags on the stems of other *Algæ*.



1. **A. brevipes**, *Agardh*. Frond with a very short stipes and 2-5 frustules, which have 2 coloured spots.—Mont. in *Voy. au Pôle Sud*, 1.

**Lord Auckland's** Island, on *Polysiphonia glomerulata*, *D'Urville*. (Common in many seas.)

#### 114. **SCHIZONEMA**, *Agardh*.

Frond of microscopic, brownish or greenish, flat filaments, which are excessively fragile, breaking up into rectilinear frustules; frustules in longitudinal series, enclosed in the simple or branched mucous or membranous frond.

Very minute *Algæ*, parasitic on other *Algæ*, etc., or occurring in floating mass.

1. **S. crispum**, *Montagne*;—*Fl. N. Z.* ii. 266. Threads tufted, green, very crisp,  $\frac{1}{3}$ – $\frac{1}{4}$  in. long, the tips penicellate; branchlets obtuse; frustules nearly parallelograms.

**Lord Auckland's** group, on *Polysiphonia glomerulata*, *D'Urville*.

## ADDITIONS, CORRECTIONS, &c.

---

Two valuable contributions to New Zealand botany have been published since the first part of this Handbook appeared, viz. Mr. Colenso's 'Essay on the Botany of the North Island,' which was printed for the Commissioners of the New Zealand Exhibition of 1865, and is full of interesting matter, which the author alone was able to supply, especially regarding the altitudinal and latitudinal ranges of the species; the other is Dr. Mueller's work 'On the Vegetation of Chatham Islands,' founded chiefly on Mr. W. Travers's collections.

For additional matter regarding the flora of New Zealand, I am especially indebted to Dr. Haast, Dr. Hector and Mr. Buchanan, Mr. Travers, Logan, Mair, Colenso, T. Kirk, Captain Rough, Drs. Knight and Lindsay.

Page

- lv. In the Key to the Artificial Classification, under Classes XXI.—XXIII., the following—*Myriophyllum*, *Loranthaceæ*, *Araliaceæ*, *Umbelliferaæ*, *Corneæ*, *Sicyos*—should form a section, with "Perianth double, superior. Corolla polypetalous."
- lxii. **Corneæ.**—The petals are *usually* valvate, not always (see *Griselinia*).
- lxvii. The Orders 5, *Jungermanniææ*, and 6, *Marchantiææ*, are treated as divisions of one Order, **Hepaticææ**, at p. 497.

### CLASS I. DICOTYLEDONS.

#### ORDER I. RANUNCULACEÆ.

1. In the generic character of *Clematis*, read Sepals 3–8, and Stamens 5–20.
2. **Clematis hexasepala.**—Southern Alps, *Haast*.
3. The Key to the species of *Ranunculus* might be improved by bringing together the species with silky carpels and white flowers—*R. Lyallii*, *Traversii*, *Buchanani*, and perhaps *insignis*.
4. **R. Lyallii**, var. *araneosa*.—Whole plant more or less covered with scattered flaccid hairs.

Page

4. **R. Traversii.**—F. Mueller considers this identical with *R. Lyallii*, but though I have received numerous specimens of the latter I find none of them with the characters of this.

5. After *R. pinguis* add—

No. 4 *bis*. **R. Godleyanus**, *Hook. f., n. sp.* Erect, very stout, a foot high, everywhere quite glabrous except the receptacle of the fruit. Stem 1 in. diameter at the base. Leaves all radical, with broad thick petioles 2–5 in. long and 1 in. broad; blade 6–7 in. long, broadly oblong, rounded at the apex, narrowed into the petiole, coarsely crenate or doubly erenate, thickly fleshy or coriaceous, with radiating reticulated nerves. Scapes stout, ascending, as long or longer than the leaves, bearing at the middle 2 or more sessile oblong bracts, and several branching or simple flowering peduncles that are 2-bracteolate at the axils. Flowers numerous, corymbose, 1–1½ in. across. Sepals broadly obovate-oblong, spreading. Petals 5, broadly obcuneate-obovate, 2-lobed at the apex, with 3 naked glands at the base, deep yellow. Achenes very numerous, forming a broad-oblong head, spreading, the lower recurved, subulate, narrowed into the slender curved styles, nearly glabrous; receptacle pilose.

**Middle Island:** Whitcombe's Pass, on the edge of a lagoon, alt. 4200 ft., *Haast*, March, 1866.—A noble plant, and worthy of the distinguished colonist whose name it bears. It approaches *R. pinguis*, and may prove a form of that very variable plant, but so far as *Haast's* excellent specimens go, it is abundantly distinct in its glabrousness, broad oblong leaves, cuneate at the base, not at all lobed, and smaller more slender achenes.

5. The following species was omitted in the Handbook:—

No. 4 *ter*. **R. Aucklandicus**, *A. Gray, Bot. U. S. Expl. Exped. i. 8.* Silky-strigose; rhizome short, thick; stem solitary, erect, 6–10 in. high, 2-leaved, 1-flowered. Leaves long-petioled, petiole strigose-hirsute, orbicular or reniform, 3-fid to or beyond the middle with closed sinus, both surfaces equally silky-strigose, 1–1½ in. diameter, thick, but not fleshy; lobes cuneiform, 2–3-lobed, again toothed or incised. Flower not seen. Receptacle of achenes cylindric, ¼ in. long, papillose, minutely hairy; achenes ovate compressed, not margined, smooth and glabrous with a short straight subulate style.

**Lord Auckland's group, Wilkes's Expedition.**—Near *R. pinguis* and possibly a form of it, if I am correct in considering *R. Munroi* a variety of that species.

5. **R. geraniifolius.**—Southern Alps, alt. 2500 ft., *Haast*.  
 5. **R. Buchanani.**—Erase the Macaulay river and Waimakeriri habitats, which belong to the following species:—  
 5. No. 7 *bis*. **R. chordorhizos**, *Hook. f., n. sp.* Everywhere glabrous, short, stout. Rhizome as thick as the finger, 2–4 in. long, almost woody, with numerous perpendicular root-fibres 6–10 in. long and as thick as whipcord. Leaves with stout petioles, 1–1½ in. long; blade coriaceous and fleshy, suborbicular, 3-partite to the base; segments broadly obovate-spatulate, almost petiolulate, 3-lobed; lobes crenate; upper surface pitted when dry. Peduncles few, thick, 1-flowered, from a scape that is much shorter than the petioles. Flowers not seen. Head of achenes globose. Receptacle

Page

small, globose. Achenes glabrous, turgid, not margined nor angled, with a slightly curved subulate style as long as the achene.

**Middle Island:** Alps of Canterbury, Macaulay river, alt. 5000 ft.; Waimakeriri district, on limestone-gravel and Mount Somers range, alt. 2-4000 ft., *Haast*.—A very remarkable species.

6. **R. sericophyllus.**—Browning's Pass, 5-7000 ft., *Haast*.
6. **R. Haastii.**—Dr. Haast assures me that this is not at all a variable plant. On the other hand, Mr. Travers sends me a specimen from shingle beds, Saddle Hill, Wairau, alt. 5000 ft., with a 1-flowered scape; it is in fruit only, and shows the remarkable flat-beaked achenes well.
7. **R. macropus.**—Found at Tapaitoitai, 300 miles N. of Poverty Bay, *Kirk*.
8. **R. gracilipes.**—Dr. Hector informs me that this species has creeping stems.

## ORDER II. MAGNOLIACEÆ.

10. **Drimys axillaris.**—Both Colenso and Buchanan agree with Raoul and others in considering there are two species of *Drimys* in New Zealand; of these, the southern one, also found in mountain districts of the Northern Island, is *D. colorata*, Raoul, differing according to Buchanan, especially in the leaves being hardly coriaceous, green on both surfaces, and not glaucous nor spotted, in the midrib not hairy, in the flowers more abundant, in the long peduncles, and in the bark being pale, not black-brown.

## ORDER III. CRUCIFERÆ.

10. In the ordinal character, *for* Stamens . . . 2 longer than the others, *read* shorter.
13. **Braya novæ-Zelandiæ.**—I have received better specimens of this from Dr. Hector; the pod is laterally much compressed, and the plant evidently closely allied to *Notothlaspi*, but differs in the valves not being winged, and in the short funicles. Considering its very curious habit, I think it should be regarded as a new genus and called *Pachycladon* in reference to the remarkably stout branches of the rhizome or stock.

## 5. PACHYCLADON, Hook. f.

Pod laterally compressed, elliptic or linear-oblong; valves convex, subcymbiform, keeled, not winged; nerves very obscure; septum incomplete; style very short; stigma capitate, 2-lobed. Seeds 3-5 in each cell, obovoid; funicles short; cotyledones incumbent.

1. **P. novæ-Zelandiæ.**—*Braya novæ-Zelandiæ*, p. 13.

15. **Notothlaspi rosulatum.**—Smells deliciously of orange-blossoms, *Haast*.

## ORDER IV. VIOLARIÆÆ.

18. **Hymenanthera crassifolia.**—Banks's Peninsula, *Haast*. Chatham



Page

Island, *W. Travers* (a very coriaceous-leaved variety, distinguished by F. Mueller as var. *Chathamica*). Dr. Mueller is disposed to unite the New Zealand, Norfolk Island and Australian species, which are all very variable plants.

ORDER V. **PITTOSPOREÆ.**

19. **Pittosporum Colensoi**.—For “leaves smaller” read “leaves larger.”
19. 2 *bis*. **Pittosporum Buchanani**, *Hook. f., n. sp.* A rambling-branched shrub, 10–12 ft. high; young shoots and leaves silky-pubescent. Leaves scattered, 2–5 in. long, of the male plant elliptic-oblong, acuminate, flat, quite entire, glabrous, of the female more oblong, shining green above, paler below. Peduncles axillary, solitary, slender, curved, silky-pubescent,  $\frac{1}{3}$ – $\frac{2}{3}$  in. long, 1–rarely 2-flowered, the male usually longest, sometimes the peduncle is short and gives off 1 or 2 slender pedicels; bracts at the base of the peduncle small, acute. Sepals oblong, obtuse. Petals linear, dark purple; of the female smaller. Capsule as in *P. tenuifolium*.
- Northern Island**: from near Tongariro (cultivated at Wellington), *Buchanan*.  
It is with great reluctance that I add another *Pittosporum* to the series, already very difficult of discrimination, that consists of *tenuifolium*, *Colensoi*, and *fasciculatum*. The present seems to be nearer to the last named species, but differs in the almost solitary flowers, slender silky peduncles, and obtuse oblong sepals.
19. **P. patulum**.—Mr. Travers sends a fruiting specimen from the Upper Wairau, together with young foliage, which is linear, very narrow, and pin-natifid.
20. **P. rigidum**.—Acheron Island, Dusky Bay, *Hector and Buchanan*.
21. **P. umbellatum**.—Peduncles sometimes only  $\frac{1}{2}$  in. long.

ORDER VI. **CARYOPHYLLLEÆ.**

22. **Gypsophila tubulosa**, appears to be rapidly spreading over New Zealand, and is, doubtless, an imported plant.
- Stellaria gracilentia**.—“Leaf-margin not revolute” (*Knight*), but I find it always much thickened or revolute to the midrib in the common form of the plant.
25. **Colobanthus Billardieri**.—Chatham Island, *W. Travers*. Distinguished as a variety by F. Mueller, on account of the short pedicels and rigid channelled leaves.
25. **C. acicularis**.—Hurumui mountains, *Travers*.
25. **Spergularia rubra**, var. *marina*.—This is a rather large flowered state of the plant; common in S. America, S. Africa, and Australia.

ORDER IX. **HYPERICINEÆ.**

29. **Hypericum gramineum**.—Colenso considers this to be a rare and local plant, but I have specimens from very distant localities (Auckland, Waipura river, and Akaroa).

ORDER X. **MALVACEÆ.**

Page

30. **Plagianthus betulinus.**—Chatham Island, *W. Travers.*  
 31. **Hoheria populnea.**—Colenso informs me that the var. *a.* is not found south of Bream Bay.  
 31. **HIBISCUS.**—In the last line of generic character, *for* cells 3- or many-ovuled, *read* cells 2-ovuled.

ORDER XI. **TILIACEÆ.**

33. **Aristotelia fruticosa.**—Hector and Buchanan appear to regard this as a form of *A. racemosa*. It is an extraordinarily variable plant.

ORDER XII. **LINEÆ.**

35. **Linum monogynum.**—Var. *a.* Chatham Island, *W. Travers.*

ORDER XIII. **GERANIACEÆ.**

35. In the Ordinal character, line 1, *read* Leaves opposite or alternate.  
 At the end of *Geraniaceæ* insert—  
 37. 5. **Geranium Traversii**, *Hook. f., n. sp.* All over hoary and almost silvery with fine white pubescence. Stems 1–2? feet long, rather stout. Leaves long-petioled, orbicular,  $1\frac{1}{2}$  in. diameter, 7-lobed to the middle; lobes cuneate, 3-fid, both surfaces equally hoary; stipules broad, almost orbicular, cuspidate. Peduncle 4 in. long, 1-flowered, slender, with 2 ovate-lanceolate acuminate bracts in the middle. Flower large, 1 in. diameter. Sepals broadly ovate, cuspidate, silky. Petals orbicular-ovate, quite entire, much larger than the sepals, white.  
**Chatham Island:** waste ground, *W. Travers.*—F. Mueller refers this to *G. dissectum*, from all states of which it appears to me to differ widely in the much larger size, almost coriaceous leaves, hoary pubescence, long 1-flowered peduncle, large white flowers, silky sepals, and entire petals. It is a beautiful plant. I have but one small specimen.  
 37. **Pelargonium australe.**—Common on the Alps of the Lake district, Otago, *Hector and Buchanan.*

ORDER XIV. **RUTACEÆ.**

40. **Melicope simplex.**—Leaves 3-foliolate, with winged petioles in young state, *Kirk.*

ORDER XV. **MELIACEÆ.**

41. **Dysoxylum spectabile.**—The Middle Island habitat is probably erroneous, *Colenso.*

ORDER XVI. **OLACINEÆ.**

41. **PENNANTIA.**—There are now three species of this genus known, the present an Australian and Norfolk Island one.

## ORDER XVIII. RHAMNEÆ.

- Page  
44. **Discaria Toumatou.**—This becomes 15 feet high in subalpine localities, *Haast*.

## ORDER XXI. CORIARIEÆ.

46. **Coriaria ruscifolia.**—Chatham Island, *W. Travers*. For an elaborate report on the poisonous properties of this plant, see Dr. L. Lindsay in Brit. and Foreign Medic. Chirurg. Review, July, 1865.
47. **C. thymifolia.**—Hector says that this is the poisonous *Tutu* and annual herbaceous *Tutu* of Otago, that it grows 4–5 ft. high, and is difficult to distinguish by leaf from *C. ruscifolia*.
47. **C. angustissima.**—Hector informs me that this is the “ground *Tutu*,” of Otago, and is subalpine and rare.

## ORDER XXII. LEGUMINOSÆ.

48. Three lines from top, for *Edwardsia* read *Sophora*.
49. **Carmichælia grandiflora.**—Flowers very odoriferous, often small, but not so small as *C. odorata*. Beak of pod sometimes  $\frac{1}{6}$ – $\frac{1}{4}$  in. long.
50. **C. odorata.**—It is difficult to distinguish this from *C. grandiflora*.
51. **Notospartium Carmichæliæ.**—Ascends to 1500 ft., *Haast*.
51. **Swainsonia novæ-Zelandiæ.**—Hurumui valley, *Travers*.
53. **Sophora tetraptera**, var. *a*. Chatham Island, *W. Travers*. I have seen no specimen.

## ORDER XXIII. ROSACEÆ.

54. **Potentilla anserina**, var.  $\beta$ . Chatham Island, *W. Travers*.
55. **Geum parviflorum.**—An extremely variable plant. *Haast* sends Mount Torlesse specimens with very slender flowering branches, and flowers not  $\frac{1}{4}$  in. diameter.
57. **Acæna inermis.**—Hurumui Mountains, *Travers*.

## ORDER XXIV. SAXIFRAGEÆ.

58. **Donatia novæ-Zelandiæ.**—Dusky Bay, on the hills, *Hector* and *Buchanan*; Ramsay glacier, 4200 ft., *Haast*.
61. **Weinmannia racemosa.**—Becomes a large tree, with close-grained hard brittle wood, *Hector* and *Buchanan*.

## ORDER XXVI. DROSERACEÆ.

63. **Drosera stenopetala.**—Milford Sound, *Hector*.

Page

ORDER XXVII. **HALORAGÆÆ.**

64. In the Key to the genera of *Haloragææ*, in the second line, *for* stigmas *read* style.
68. **Callitriche verna**.—This is the form or species called *C. stagnalis*, Scopoli (*C. platycarpa*, Kuetzing), and is *C. verna*  $\beta$ , of Linnaeus, distinguished by the broad thick wings of the fruit, and broad short leaves.

ORDER XXVIII. **MYRTACEÆ.**

70. **Leptospermum ericoides**.—Mr. Kirk sends a remarkable variety? of this species, with silky branchlets, and differing greatly in size and habit from *L. ericoides*, which grows near it. The species of this genus are, however, so variable that I do not venture to make a new one of this. He thus describes it:—

“Young leaves and branches more or less pubescent. Leaves sessile, scattered and fascicled, linear-lanceolate, margins recurved, pungent, much dotted. Flowers minute, sessile or shortly peduncled. Petals much crumpled. Capsules very small, with persistent calyx-lobes.”

**Northern** Island: Apatawapa and Coxe's Creek, *Kirk*.

71. **Metrosideros lucida**.—Often attains the size of a large tree, *Hector*.
74. **Myrtus pedunculata** and **M. obcordata**.—Both abundant in Otago, *Hector* and *Buchanan*, etc.

ORDER XXIX. **ONAGRARIÆÆ.**

75. **FUCHSIA.**

There are three tolerably distinct forms or species of the genus in New Zealand, which may be thus distinguished:—

Petioles shorter than the leaves. Stamens as long or longer than the calyx-lobes . . . . . 1. *F. excorticata*.

Petioles as long as or longer than the leaves.

Stems procumbent, filiform. Stamens shorter than the calyx-lobes . . . . . 2. *F. procumbens*.

Stems branching low, woody. Stamens as long as or longer than the calyx-lobes . . . . . 3. *F. Colensoi*.

Of these, **F. excorticata** forms a tree with ovate-lanceolate leaves, silvery below. Flowers  $\frac{3}{4}$ – $1\frac{1}{2}$  in. long. It is common throughout the Island.

**F. procumbens** is very slender, creeping or prostrate. Leaves rounded-ovate or -cordate. Flowers not  $\frac{1}{3}$  in. long. I have it from the Northern Island, *A. Cunningham* and *Colenso*.

**F. Colensoi** is intermediate in size. Leaves very variable, ovate orbicular or cordate. Flowers as large as in *F. excorticata*.—Northern Island, *Colenso*. Middle Island, common, Canterbury plains, *Travers*; Otago, *Lindsay*, *Hector*.

81. **Epilobium pallidiflorum**.—*E. tetragonum*, F. Mueller, Veg. Chatham Island. Chatham Island, *W. Travers*.



ORDER XXX. **PASSIFLOREÆ.**

Page

81. The seeds are inadvertently described as *exalbuminous* instead of *albuminous*.  
81. Line 4 from bottom, *for tetramerous read pentamerous*.

ORDER XXXII. **FICOIDEÆ.**

84. **Mesembryanthemum australe**.—Chatham Islands, *W. Travers*.  
84. **Tetragonia trigyna**.—This Dr. Mueller assures me is the true *T. implexicoma*, Miquel, of Australia. Littleton Harbour, *Travers*. Styles 2–4. Stamens 12–16.—Var. *Chathamica*, F. Muell. Veg. Chatham Island. Leaves broader. Calyx-lobes 4–5, broader, more unequal. Styles 3–4, shorter.—The flowers are usually unisexual in this genus.

ORDER XXXIII. **UMBELLIFERÆ.**

86. **Hydrocotyle heteromera**.—Colenso sends a small state with leaves only  $\frac{1}{8}$  in. broad.  
88. **Pozoa trifoliolata**.—This is a Middle Island plant, the Totara-nui of Captain Cook being in that Island.  
90. **Eryngium vesiculosum**.—Colenso assures me that this is a rare and local plant, and has not been found at Auckland, where I supposed Dr. Sinclair had gathered it.  
91. **Oreomyrrhis Colensoi**.—Waipura, on limestone rocks, *Haast*.  
91. **O. ramosa**.—Glacier gully, Wairau Mountains, *Travers*.  
91. **O. andicola**, *Endl.* A native of Australia and Chili; is erroneously stated in Benth. Fl. Austral. iii. 377, to be a native of N. Zealand.  
92. **Aciphylla Lyallii**.—Waiau range, *Travers*. Buchanan regards this as a var. of *A. Colensoi*, and *A. Munroi* as a var. of *A. squarrosa*.  
93. **A. ? Traversii**, *F. Mueller, Veg. Chatham Islands*, 18 (*Gingidium*). Dr. Mueller enumerates the above as a probably new Chatham Island species, allied to *A. Munroi*; his description is incomplete; the leaves have a denticulate sheath and 2 or 3 rigid longitudinally-striated segments; bracts linear, undivided, passing into the sheath without denticulations.  
93. **Ligusticum Dieffenbachii**.—(*Gingidium*, F. Muell. Veg. Chatham Island, 17.) Tall, erect, sheaths of petioles produced into 2 obtuse teeth. Leaves 3-pinnatisect; segments long-linear, flat, flaccid, 7-nerved, mucronate; rachis imperfectly jointed. Bracts 5-partite. Umbels compound, numerous, paniced; involueral leaves few, narrow-lanceolate. Calyx-teeth of male-florets short.—*Mueller, l. c.*

**Chatham** Island: under maritime cliffs, *W. Travers*. (Specimen imperfect.)

95. **L. Lyallii**.—Common on the shores of the West coast of Otago, *Hector and Buchanan*.

Page

95. **L. Haastii.**—Waiau range, alt. 4000 ft., and Hurumui Mountains, *Travers.*
95. **L. filifolium.**—Fruiting specimens have been sent by Haast, and by Travers from the Waiau and Hurumui Mountains.—Fruit  $\frac{1}{3}$  in. long, narrow-oblong, much compressed, pale, styles very short; mericarps flattened, with 5 nearly equal prominent acute ridges; commissural suture flat.—This plant hence exhibits the broad flat lateral wings of *Angelica*, and short styles of *L. brevistyle*. It is intermediate between *Angelica* and *Ligusticum*.
96. **L. carnosulum.**—Fruiting specimens have been received from Haast, also gathered on Mount Torlesse. They are very stout, almost woody, rigid. Fruit sunk in the axils of the involucreal leaves, almost sessile,  $\frac{1}{3}$  in. long; styles rigid, subulate; mericarps incurved, ridges acute, not prominent; commissural suture rounded.
96. **L. piliferum.**—Travers sends specimens from the Waiau Mountains, alt. 4000 ft., with shorter hairs terminating the segments of the leaflets.
96. **L. aromaticum.**—For 4–6500 ft. read 2–5000 ft.
97. **L. imbricatum.**—Waiau range, Saddle hill, on shingle, alt. 5500 ft., *Travers.*
98. **Angelica decipiens.**—Waiau range, *Travers.* I have an imperfect specimen apparently of this plant from Colenso.
98. **A. rosæfolia.**—Canterbury, *Travers.*

ORDER XXXIV. **ARALIACEÆ.**

101. **Panax anomalum** is not found at the Bay of Islands, according to Colenso.
101. **P. Edgerleyi.**—Leaflets in young plant deeply sinuate-pinnatifid. (See below, note on *P. Colensoi*.) Used by the natives to scent themselves (*Hector*).
101. **P. lineare.**—Dusky Bay, *Hector and Buchanan*. A shrub 6–10 ft. high.
101. **P. crassifolium.**—Chatham Island, *W. Travers*. Referred to *Hedera* by A. Gray (Bot. U. S. Expl. Exped. 719), and to *Pseudopanax* by Seemann (Journ. Bot. 1865, p. 178).
102. **P. longissimum.**—Referred to *Pseudopanax crassifolium* by Seemann (Journ. Bot. 1864). It is *P. coriaceum*, Regel, Gartenflora, 1859, 45. Mr. Logan has sent me specimens clearly showing that it is only the young state of *P. crassifolium*.
102. **P. Lessonii.**—Otago, West coast, *Hector*. Is referred to *Hedera* by A. Gray. Bream Bay, where it was gathered by D'Urville, is in the Northern Island. Also referred to *Pseudopanax* by C. Koch and Seemann.
102. **P. Colensoi.**—Mr. Logan informs me that the plant with pinnatifid leaflets, figured in Fl. N. Z. t. 21, is the young state of *P. Edgerleyi*, and not of this species.

Page

102. **P. arboreum**.—Colenso informs me that this is found chiefly on sea-coasts and banks of rivers.
104. **Meryta Sinclairii**.—Dr. Seemann having referred this plant to its proper genus in the 'Bonplandia,' his name should be attached to it.
104. **Polyscias pinnata**, *Forst.*, a Pacific Island Araliaceous plant, was erroneously described as a native of New Zealand.

ORDER XXXVI. **LORANTHACEÆ.**

107. **Loranthus tetrapetalus**.—Otago, *Hector and Buchanan*.
108. **Viscum salicornioides**.—Colenso observes that this is a very rare and local plant in the Northern Island, being confined to two spots, near the Bay of Islands, and at Wellington, and found only on *Dracophyllum*, *Gaultheria*, and *Leptospermum*.

ORDER XXXVII. **CAPRIFOLIACEÆ.**

109. **Alseuosmia macrophylla**.—"Flowers full bright crimson, berries crimson," *Kirk, mss.*
109. **A. quercifolia**.—Mr. Colenso affirms that this is found nowhere between the Bay of Islands and Te-Hawera. "Tube of flower crimson, lobes tipped with green, berry crimson," *Kirk, mss.*
109. **A. linariifolia**.—"Flowers crimson, lobes paler. Berry crimson," *Kirk, mss.*

ORDER XXXVIII. **RUBIACEÆ.**

113. **Coprosma petiolata**.—Chatham Island, *W. Travers*.

ORDER XXXIX. **COMPOSITÆ.**

122. In Key of *Compositæ*, 12. *Ozothamnus*, omit the word *not* from the diagnosis.
124. **Olearia operina**.—Edges of sounds on the West coast of Otago, from Milford Sound southwards, growing sometimes 10–12 ft. high, with trunk 6–8 in. diameter. Found only at the level of the sea. *Hector and Buchanan*.  
**Chatham** Island, *W. Travers*. A form with lax bracts on the scapes, thus connecting it with *O. angustifolia*.
124. **O. semidentata**.—Chatham Island, *W. Travers*.
125. **O. Colensoi**, var.  $\beta$ .—Otago, West coast, found at the level of the sea. 10–12 ft. high, on the mountains, alt. 3–4000 ft., where it forms impenetrable thickets, and has simply serrated leaves. *Hector and Buchanan*.
126. **O. insignis**.—Wairau district, in rocky places, *Rough*.
126. After 9. **Olearia dentata**.—  
9a. **O. Traversii**, *F. Muell. Veget. of Chatham Island*, 19 (*Eurybia*). Arboreous, 30–35 ft. high. Branches and branchlets opposite, covered with silky down, as are the panicles, involucre, and leaves beneath. Leaves plane,

Page

opposite, oblong- or ovate-lanceolate, acuminate, quite entire,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, glabrous and shining above; midrib obscure beneath, as are the veins, which form an acute angle with the midrib. Panicles numerous, cymose, axillary and terminal, much branched. Flower-heads very numerous, on slender pedicels, small,  $\frac{1}{4}$  in. long. Involucral scales few, hardly imbricate, linear-oblong, obtuse, very silky. Florets of the ray with a short ray. Achene silky. Pappus rufous when dry.

**Chatham** Island, *W. Travers*, where it forms the principal wood, and is called "Ake Ake," and "Bastard Sandalwood-tree."

126. No. 11 *bis*. *O. lacunosa*, *Hook. f., n. sp.* Branchlets, petioles, leaves below, and panicle covered with pale rusty buff tomentum. Leaves shortly petioled, 4–6 in. long, narrow-linear or linear-oblong,  $\frac{1}{3}$  to  $\frac{2}{3}$  in. broad, acute or acuminate, quite entire, glabrous and reticulated above, coriaceous; midrib stout; lateral nerves at right angles to the midrib, close set, very prominent, dividing the under surface of the leaf into numerous rather deep pits. Panicle on a short slender peduncle, corymbose; branches elongate and branchlets slender. Heads small,  $\frac{1}{8}$  in. diameter; involucre turbinate, scales few, pubescent, linear-oblong; florets very small. Achene compressed, pubescent.

**Middle** Island: Rotoroa Lake, alt. 5–7000 ft., *Travers*; Harper's Pass, alt. 3000 ft., *Haast*. A very singular and most distinct species, quite unlike any other. The very numerous short stout parallel nerves at right angles to the midrib afford a distinctive character.

126. *O. Haastii*.—Otago Alps, *Hector and Buchanan*. Leaves longer and narrower.
127. *O. nummularifolia*, var. *cymbifolia*.—A short stout erect woody shrub, 1 ft. high and upwards. Leaves close-set, spreading or deflexed,  $\frac{1}{4}$  in. long, shortly petioled, oblong, obtuse, quite entire, glabrous and very convex above with strongly revolute margins all round, hence boat-shaped with the concavity downwards, viscid and pitted above, beneath and petiole covered with buff or white tomentum; nerves invisible. Heads solitary or few, on slender stiff erect powdery pedicels, as long or longer than the leaves,  $\frac{1}{2}$  in. long; involucre cylindric, scales oblong, glutinous, obtuse, appressed, imbricate. Achene narrow, elongate, angled, pubescent near the top.
- Alps of Canterbury, Mount Fenzl and Mount Potts, alt. 3–4000 ft., *Haast*; Hurumui Mountains, *Travers*. A very distinct-looking variety, but hardly a different species.
127. *O. Forsteri*.—Mount Somers range. Leaves broader, subcordate, *Haast*.
127. *O. (Eurybia) cydoniæfolia*, *DC. Prod. v. 267*, is erroneously stated to be a native of N. Zealand.
130. *Celmisia holosericea*.—West coast of Otago, from the sea-level to 3–4000 ft., *Hector and Buchanan*.
133. *C. Lyallii*.—The "blunt-leaved Spaniard" of the Canterbury Alps.
133. *C. viscosa*.—For *Sinclair and Haast* read *Hector and Buchanan*.
134. *C. petiolata*, page 135, *C. Hectori*, and *C. sessiliflora*. After Mount Brewster read *Haast* (not *Hector and Buchanan*), who found the same species on Mount Alta.
134. *C. Traversii*.—Mr. Travers has sent me another specimen, with the leaves (and sheath) 12 in. long and the blade  $2\frac{1}{2}$  across.



Page

135. 21 *bis*. **C. ramulosa**, *Hook. f., n. sp.* Stem woody, procumbent, branched, slender; branches ascending, 2–4 in. long, densely clothed with closely imbricating short leaves. Leaves very numerous,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, linear-oblong, obtuse, subcoriaceous, with broad membranous sheathing bases, glabrous above, clothed beneath with snow-white cobwebby wool; margins strongly revolute. Scape  $\frac{1}{2}$  in. long, slender, terminal, tomentose, with one or two bracts. Head campanulate, nearly 1 in. diameter; involucreal scales linear-oblong, erect, pubescent and glandular. Rays  $\frac{1}{2}$  in. long.

**Middle Island**: Dusky Bay mountains, alt. 3500 ft., *Hector and Buchanan*. A remarkable species, with a woody prostrate stem as thick as a crowquill and subfrutescent habit, approaching *Olearia*.

136. **Vittadinia australis**, *A. Rich.*—Mueller and Benthams consider this to be identical with the Australian species, and the former observes that it is also found in New Caledonia.

141. **C. lanata**.—The *Leptinella potentillina*, F. Mueller (Veg. Chatham Islands, 28), only differs from this in the eglandular florets, and from *L. dioica* in the more deeply-cut leaves and unisexual heads.

142. **C. atrata**.—This should be inserted before 3. *C. plumosa*, as in Key.

142. **C. minor**.—Otago, *Hector and Buchanan*.

142. After 8. *C. pectinata*, insert, **Cotula (Myriogyne) Featherstonii**, F. Muell. Veg. Chatham Islands, 27 (*Leptinella*). Branched, prostrate, downy. Leaves obovate or oblong cuneate, 3-toothed at the apex, narrowed to the sessile base. Head axillary and terminal, peduncled, 2-sexual. Involucreal scales 10–12, sub-2-seriate, unequal, lanceolate. Receptacle depressed, hemispherical; female florets numerous, stipitate; corolla minute, conic, pale, glandless; male florets 4-toothed, glandless. Achene obovate-cylindric, striate, slightly glandular. *F. Muell.*

**Chatham Island**: damp maritime rocks, *W. Travers*.

143. **C. dioica**.—Erase “but eglandular” in the last line of the description, the florets being eglandular both in this and *C. perpusilla*.

144. See previous page.

146. **Ozothamnus glomeratus**.—Colenso informs me that this is not found north of the East Cape.

146. **O. depressus**.—Canterbury, descending nearly to the sea, *Haast*.

148. **Raoulia tenuicaulis**.—Otago mountains, *Hector and Buchanan*. Leaves sometimes obtuse.

150. **R. grandiflora**.—The Mount Brewster specimens were collected by *Haast* (not *Hector and Buchanan*, who, however, gathered this species in Mount Alta).

155. **HAASTIA**.—I accidentally omitted to mention under this genus that it is named in honour of my friend Dr. Julius Haast, F.L.S. and F.G.S., the distinguished explorer and geological surveyor of Canterbury, whose botanical discoveries have so greatly enriched this volume.

Page

156. **H. Sinclairii**.—Mount Alta, and in the lake district Otago, on dry debris, *Hector and Buchanan*.
157. **Erechtites scaberula**.—After “in various places,” read “not so common,” etc.
159. **Senecio bellidioides**, var.  $\gamma$ ; this is *S. Traversii*, F. Muell. in Trans. Bot. Soc. Edinb.
159. **S. latifolius**.—Harper’s range, Hurumui Mountains, alt. 2600 ft., *Haast*. Lower leaves petiolate. Achenes pilose.
160. **S. lautus**.—Syn. *S. radiolatus*, F. Muell. Veg. Chatham Island.—Chatham Island, *W. Travers*, a broad membranous-leaved form, also found in New Zealand. *S. angustifolius*, Forst. Prod. p. 91, seems to be a variety of this.
161. **S. odoratus**.—Banks’s Peninsula, *Haast*. This is distinct from the Australian *S. odoratus* in the ligulate ray-flowers, and must here be kept as *S. Banksii*, according to Benthams (Fl. Austral. iii. 671).
161. **S. bifistulosus**.—A branching shrub 1–2 ft. high. Dusky Bay, alt. 2500 ft., *Hector and Buchanan*.
161. 13 bis. **S. Huntii**, F. Muell. *Veget. of Chatham Island*, 23. t. iii. A shrub 20 ft.; branchlets, leaves above more or less, and inflorescence glandular-pubescent. Leaves 2 in. long,  $2\frac{1}{2}$  in. broad, elliptic-lanceolate, sessile, acute, beneath covered with thin appressed fulvous tomentum; margins downy, subrevolute, quite entire; midrib rather thick below; nerves obscure. Panicle terminal, very large, broadly and shortly conical, much branched, 3–5 in. broad. Heads crowded, on slender almost hirsute glandular pedicels,  $2\frac{1}{2}$  in. diameter. Pedicels with a few linear bracts. Involucre broadly campanulate; scales linear-oblong, obtuse, membranous, glandular and villous at the tips. Rays few,  $\frac{1}{4}$  in. long, revolute. Anthers without tails; pappus-hairs slender, scabrid, white. Achene (young) glabrous, grooved.
- Chatham** Island: waste places, *W. Travers*. A very distinct species, but described from single specimens.
162. **S. elæagnifolius**.—Probably only a form of *S. rotundifolius*. The achenes are sometimes glabrous, the petioles slender, and tails of anthers very short indeed.
162. **S. rotundifolius**.—Syn. *S. Reinoldi*, Endl.—Abundant on the west coast of Otago, on the east found at 2000–3000 ft.; also in Stewart’s Island. It varies extremely in the foliage from orbicular to elliptical.
163. **S. cassinioides**.—Cameron river, alt. 3000–4000 ft., *Haast*. Lake district, Otago, alt. 1000–2000 ft., *Hector and Buchanan*.
163. **Brachyglottis repanda**.—Syn. *Senecio Georgii*, Endl.
163. **TRAVERSIA**.—I accidentally omitted to state that this remarkable genus is named in honour of my correspondent W. T. Locke Travers, Esq., F.L.S., of Canterbury, who has contributed so largely to our knowledge of the botany of the Middle Island of New Zealand.

- Page  
165. **Taraxacum Dens-leonis**.—Chatham Island, *W. Travers*. The indigenous form.
166. **Sonchus oleraceus**.—Chatham Island, *W. Travers* (fruits unknown).

## ORDER XLI. CAMPANULACEÆ.

169. **Wahlenbergia gracilis**, *A. Rich.*—Mueller points out that *A. De Candolle*'s specific name of *gracilis* has two years' priority over *Richard*'s, and therefore *A. DC.* should be substituted for *A. Rich.*
171. **Lobelia rugulosa**, *Graham in Edinb. New Phil. Journ.* 1829; *DC. Prod.* vii. 366, is, I suspect, a synonym of *Pratia angulata*.
171. **L. anceps**.—Chatham Island, *W. Travers*.
173. **Selliera radicans**.—Limestone Cliffs, Weka Pass, *Haast*.

## ORDER XLII. ERICEÆ.

175. Under observations on *Gaultheria rupestris*, for "ground-parrots" read "tree-parrots."
177. **Cyathodes? pumila**, *Hook. f., n. sp.* Small, densely tufted; branches 1-2 in. long, slender, suberect, fascicled. Leaves densely imbricate,  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, incurved, shortly petiolate, linear-oblong, apiculate; margins broadly scarious towards the apex, flat above, glaucous below; midrib stout, margin thickened. Flowers solitary, axillary, sessile, longer than the leaves; pedicels covered with 8 or more broad concave ciliated bracts. Sepals oblong, obtuse, ciliated. Corolla tubular, twice as long the sepals; lobes densely bearded within. Style short, 5-toothed at the apex. Ovary 5-celled, cells 1-seeded.
- Middle Island**: Hurumoi Mountains, *Travers*. This may be a *Pentachondra*; it is impossible to say without the fruit.
178. After *L. fasciculatus*, add—

**Leucopogon Richei**, *Brown*. A slender erect, much-branched shrub, 4 ft. high and upwards; branches somewhat fascicled. Leaves  $\frac{1}{2}$  in. long, linear-lanceolate or rather dilated towards the tips or above the middle, caute or acuminate; margins recurved, pale or glaucous below, with 3-5 faint nerves. Spikes subterminal, shorter than the leaves, many-flowered, glabrous or puberulous. Flowers small,  $\frac{1}{8}$  in. diameter. Calyx-lobes oblong, obtuse. Corolla-lobes linear. Bracts persistent, small. Drupe fleshy, 3-5-celled (not seen in New Zealand specimens).

**Chatham Island**, *W. Travers*. A native of extratropical Australia, but not hitherto found in New Zealand proper.

179. **Epacris pauciflora**.—Rare and local, according to *Colenso*. I have seen it from the Bay of Islands, Nelson, and some intermediate localities.
180. **Archeria Traversii**, var. *australis*. Leaves  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, elliptic-lanceolate or oblong, obtuse, very coriaceous, quite entire, flat or concave above, ribbed with few parallel nerves below when dry. Racemes terminal,  $\frac{2}{3}$  in. long, stout, erect, pubescent, 8-12 ft. Flowers  $\frac{1}{2}$  in. long, secund; pedicels short, pubescent; bracts linear, as long as the pedicels, caducous.

Page

Calyx-lobes broadly oblong, very obtuse, striate on the back, not half as long as the campanulate red corolla. Ovary glabrous; style very short. Capsule depressed,  $\frac{1}{10}$  in. diameter.

**Middle Island**: Otago, common on the west coast, *Hector and Buchanan*. Much stouter than *A. Traversii*. Leaves broader and flowers larger. I have specimens of *A. Traversii* from Browning's Pass, alt. 3000–3500 ft.

181. *D. latifolium*, var. *ciliolatum*.—Edges of the leaves ciliate.—Chatham Island, *W. Travers*.

181. *D. strictum*.—All sounds on the west coast, *Hector and Buchanan*. A small tree in Canterbury, *Haast*.

181. After *Dracophyllum strictum*, add—

1. *D. Traversii*, *Hook. f.*—Much the largest species of the genus. Leaves 1 ft. long and upwards,  $1\frac{1}{2}$ –2 in. broad at the base, very coriaceous, ensiform, gradually tapering from the base to the apex; margin quite entire and smooth to the touch, slightly concave, minutely striated. Panicle terminal, strict, sessile, linear-oblong, very dense; branches short, suberect, crowded, stiff, puberulous. Flowers crowded, sessile, small,  $\frac{1}{8}$  in. diameter; bracts and sepals nearly orbicular, obtuse, glabrous. Corolla very broadly campanulate; tube no longer than the sepals; lobes reflexed. Ovary glabrous; scales oblong, retuse; style stout and exserted.

**Middle Island**: Nelson Province, *Travers*.

182. *D. Urvilleanum*, var. *scoparium*.—Chatham Island, *W. Travers*; Otago, *Hector and Buchanan*.

#### ORDER XLIII. MYRSINEÆ.

184. After *Myrsine Urvillei*—

*M. Chathamica*, *F. Muell. Veg. Chatham Island*, 38. Shrubby, erect, much-branched. Leaves  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, obovate-oblong, obtuse or emarginate, pale and reticulated on both surfaces. Flowers unknown.

**Chatham Island**, *W. Travers*. There are no flowers in my specimen. The fruit is described by F. Mueller as purplish, spherical, 1-seeded, size of a large pea. Calyx-lobes ciliate; pedicels very short. Perhaps only a large state of *M. Urvillei*.

184. *M. divaricata*.—Common on both the east and west coasts of Otago, *Hector and Buchanan*.

#### ORDER XLIV. PRIMULACEÆ.

185. *Samolus littoralis*.—Chatham Island, *W. Travers*. Mueller correctly observes that the specific name of *S. repens*, Persoon, has the priority over *S. littoralis*, Br.

#### ORDER XLVI. JASMINEÆ.

187. *Olea montana*.—Mr. Colenso assures me that the Bay of Island habitat is erroneous.



ORDER XLVIII. LOGANIACEÆ.

Page

188. Before *Logania*, insert—

1. **MITRASACME**.—Small annual, rarely perennial, herbaceous plants. Leaves opposite, often connate, quite entire, exstipulate. Flowers minute, axillary and umbelled, or solitary and terminal. Calyx 2-4-lobed or partite. Corolla 4-lobed or partite; lobes valvate. Stamens 4, filaments short or slender. Ovary 2-celled; styles 2, distinct, or connate by the capitate stigmas; ovules several or numerous, attached to axile placentæ. Capsule turgid, 2-celled, dehiscing loculicidally between the styles at the summit. Seeds numerous, roughish; albumen fleshy.

A considerable genus of small plants, natives chiefly of Australia. A few are Indian.

1. **M. novæ-Zelandiæ**, *Hook. f., n. sp.* A small moss-like glabrous densely-tufted perennial. Stems and branches very short, filiform, interwoven. Leaves  $\frac{1}{12}$ – $\frac{1}{10}$  in. long, densely imbricate, linear-oblong, acuminate, with a bristle at the apex, connate by their broad bases, quite glabrous, coriaceous, rather coneave, nerveless. Flowers terminal, sessile, hidden by the uppermost leaves. Sepals like the leaves. Corolla shortly and broadly tubular; lobes 4, short, obtuse. Stamens with short filaments and broad didymous anthers. Stigmas free.

**Middle Island**: Dusky Bay, *Hector and Buchanan*, on the hills, alt. 3500 ft. Allied to the Tasmanian *M. montana*.

189. **Logania tetragona**.—Sounds of the west coast of Otago, *Hector and Buchanan*.—Stipules 0. Flowers solitary, terminal. Calyx-tube and lobes below pubescent, glandular, and almost hispid. Corolla funnel-shaped,  $\frac{1}{3}$  in. diameter; tube short; lobes 5, very large and spreading. Throat quite glabrous. Stamens 5; filaments short, inserted within the tube; anthers short, 2-cleft halfway up. Capsule enclosed in, and half as long as the calyx-lobes; valves obovate, retuse.

189. 3. **L. ciliolata**, *Hook. f. n. sp.* Stems prostrate, much branched; branches ascending, 1-3 in. high, glabrous, densely covered with closely-imbricate leaves, hence tetragonous and  $\frac{1}{3}$  in. diameter. Leaves densely packed, spreading, linear or linear-oblong, obtuse, very coriaceous, connate in pairs, ciliate along all the margins, nerveless, convex at the back. Flowers solitary in the axils of uppermost leaves,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diameter. Calyx deeply 4-cleft; lobes glabrous, ciliated on the margins. Corolla with a short funnel-shaped tube; lobes 4, orbicular, spreading; mouth glabrous. Stamens 4; filaments short, inserted within the mouth of the corolla; anthers oblong-sagittate. Ovary narrow, seated in a cup-shaped disk; style slender, stigma minute. Capsule not seen.

**Middle Island**: slopes above Browning's Pass, alt. 4-6000 ft., *Haast*.—So similar in most characters to *L. tetragona* that it is difficult to suppose that intermediates may not occur, but the leaves are longer, ciliate to the apex; the branchlets and calyx glabrous; the flowers very much smaller and 4-merous, and the anthers shorter.

ORDER XLIX. GENTIANEÆ.

190. **Gentiana pleurogynoides**.—Chatham Island, *W. Travers*.

Page

192. **Myosotis uniflora**.—Shingle beds, Lake district, Otago, *Hector and Buchanan*. A monstrous state, with proliferous tips to the branches.

194. After **Myosotis Traversii**, insert—

10. **M. albo-sericea**, *Hook. f. n. sp.* Root perennial. Whole plant covered with white appressed silky hairs. Stem tufted, short, woody at the base. Leaves densely tufted, about 1 in. long, very narrow, linear-spathulate, acute,  $\frac{1}{12}$  in. broad where most dilated, gradually dilated from the petiole, uniformly silky on both surfaces. Flowering stems 3–4 in. high, slender, ascending, with scattered leafy bracts to above the middle, upper part naked; lobes linear, hairs straight, appressed. Flowers apparently yellow, on short peduncles. Raceme short, naked. Calyx  $\frac{1}{8}$  in. long. Corolla tube dilated, twice as long as the calyx; lobes  $\frac{1}{3}$  in. across. Anthers included, narrow linear-oblong.

**Middle Island**: Dunstan gorge on the Clutha river, Otago, *Hector and Buchanan*. A most distinct plant, of which I have but one specimen.

125. **Exarrhena macrantha**.—The flowers are dark orange and yellow, very sweet-scented.

197. **Myosotidium nobile**.—Chatham Island, *Travers*.

#### ORDER LI. CONVULVULACEÆ.

198. **Convolvulus Tuguriorum**.—Chatham Island, *W. Travers*.

198. **Convolvulus erubescens**.—Ascends to 5500 ft. on the Barefells pass, *Travers*.

#### ORDER LII. SOLANEÆ.

200. **Solanum aviculare** and **S. nigrum**.—Chatham Island, *W. Travers*.

#### ORDER LIII. SCROPHULARINEÆ.

201. **Calceolaria Sinclairii**.—Corolla white, spotted with purple, *Colenso*.

203. **Mazus Pumilio**.—The position of the bract is very variable.

237. **Veronica salicifolia**.—Chatham Island, *Travers*.

208. **V. Traversii**.—Chatham Island, *Travers*.

209. **V. elliptica**.—Chatham Island, *W. Travers*.

209. **V. lævis**.—Hurumui Mountains, 3000–4000 ft., *Travers*.

211. **V. pimeleoides**, var. *minor*.—Smaller, leaves lanceolate, acute,  $\frac{1}{8}$  in. long.

**Middle Island**: Shingle beds near Lake Heron, *Haast*.

211. **V. tetragona**.—Otago, Greenstone Valley, *Hector and Buchanan*.

218. **Ourisia macrophylla**.—Otago, west coast, *Hector and Buchanan*.

218. **O. sessilifolia**.—Dusky Bay, alt. 3500 ft., *Hector and Buchanan*.

219. **O. cæspitosa**, var. *gracilis*.—Stems more slender. Leaves much smaller,  $\frac{1}{10}$ – $\frac{1}{8}$  in. long. Scapes slender, 1-flowered; bracts opposite, small; pedicels very slender. Sepals linear-oblong, obtuse, not dilated at the apex. Corolla smaller.

Page

**Middle Island:** Kowai river and Mount Torlesse, alt. 4000 ft., *Haast*; Otago, Lake district, alpine and Maranoa river, *Hector and Buchanan*.—Very different-looking from *C. cæspitosa*, but there are quite intermediate forms.

219. *O. glandulosa*.—Lake Guyon range, Waiau, 3500 ft. on rocky ground, *Travers*.

## ORDER LIV. GESNERIACEÆ.

221. *Rhabdothamnus Solandri*.—Colenso observes that this is an excessively local plant, and not found by him south of Bream Bay.

## ORDER LVI. VERBENACEÆ.

225. The *Teucrium sphærocarpum*, Mueller, is now referred by that author to *Spartothamnus* and to the Natural Order *Myoporineæ*.  
225. *Myoporum lætum*.—Chatham Island, *W. Travers*.

## ORDER LVIII. PLANTAGINEÆ.

228. *Plantago Raoulii*.—Colenso says that this is by no means common in the Northern Island.  
*P. major*.—Mr. Colenso is disposed to regard this as indigenous, it having a native name. I cannot doubt its having been introduced.

## ORDER LIX. NYCTAGINEÆ.

229. *Pisonia Brunoniana*, Endl.—Seemann, Journ. Bot. i. 244, observes that the New Zealand plant is identical with *Ceodes umbellifera*, Forst. (*Pisonia umbellifera*, Seemann); whereas the *P. Brunoniana*, Endl., is different, and the same with *P. inermis*, Forst., a native of the Malayan and Pacific islands and of Australia.

## ORDER LX. CHENOPODIACEÆ.

231. *Chenopodium triandrum*.—Hector observes that the utricle is fleshy.  
232. *Atriplex Billardieri*.—Outer East coast, *Colenso*.

## ORDER LXIII. POLYGONEÆ.

235. *Polygonum minus*, var. *decipiens*.—Chatham Island, *W. Travers*.  
236. *Muhlenbeckia appressa*.—Add syn. *Polygonum Forsterii*, Endl.  
237. *M. ephedroides*.—Canterbury, Waipura, *Haast*.

## ORDER LXIV. LAURINEÆ.

238. *Tetranthera calicaris*.—Add syn. *T. Tangao*, R. Cunn. mss.; Meissn. in DC. Prod. 35, pt. i. 191.

## ORDER LXV. MONIMIACEÆ.

240. *Hedycarya dentata*.—Common in Otago, *Hector and Buchanan*.

Page

ORDER LXVII. **THYMELEÆ.**

243. **Pimelea buxifolia.**—Kaweka Mountain, Hawke's Bay, *Colenso*.  
 244. **P. arenaria.**—Chatham Island, *W. Travers*.  
 244. **P. Urvilleana.**—Otago, *Lindsay*.

ORDER LXIX. **EUPHORBIACEÆ.**

248. **Euphorbia glauca.**—Chatham Island, *W. Travers*.  
 248. **Carumbium polyandrum.**—This species had, unknown to me, been already described by Joh. Mueller in the 'Ratisbon Flora' (1864, p. 434), and under the same name of *C. polyandrum*.

ORDER LXX. **CUPULIFERÆ.**

250. **Fagus cliffortioides.**—*For* 5-7000 ft. *read* 2-4800 ft.—This is the *Cliffortioides cordata* of Forster's Prodrömus.

ORDER LXXI. **URTICEÆ.**

251. **Epicarpurus microphyllus.**—Otago, *Lindsay*.  
 251. **Urtica incisa.**—Chatham Island, *W. Travers* (according to F. Mueller).  
 I have seen no specimens.  
 251. **Urtica australis.**—Chatham Island, *W. Travers*.

ORDER LXXII. **CHLORANTHACEÆ.**

253. **Ascarina lucida.**—Middle Island, Totara-nui, *Banks and Solander*.  
 Common in all the sounds on the west coast of Otago, with stems 6-12 in. diameter, *Hector*.

ORDER LXXIII. **PIPERACEÆ.**

254. **Piper excelsum.**—Add syn. *Macropiper excelsum*, Miquel. Chatham Island, *W. Travers*. Mr. Colenso observes that the leaves are not eaten, but the pulp of the ripe fruit was.  
 256. 1. **DAMMARA.**—The inflorescence is monœcious in various species, perhaps in all.

ORDER LXXIV. **CONIFERÆ.**

257. **Podocarpus ferruginea.**—Common in the Canterbury province, skirting the plains, *Haast*. Hector and Buchanan state that this is common on the west coast of Otago, on river flats; it is one of the "Black Pines" of settlers. "Miro" of Middle Island. According to these gentlemen's notes there are three forms of this tree in Otago, viz. :—  
 1. A large tree, common near Dunedin, with very small leaves.  
 2. A large-leaved light-coloured tree ("common Black Pine").  
 3. A tree on the west coast, with very large dark-coloured leaves



Page

258. **P. Totara.**—Trunk sometimes 10 ft. diameter. Hector and Buchanan consider the species of the west coast of Otago different from the eastern; having dense foliage and more obtuse leaves, its trunk does not attain more than 2 ft. diameter.
258. **P. spicata.**—Add syn. *P. Matai*, Lambert. Like *P. ferruginea*, this is also called “Black Pine” in Otago, is the “*Mai*” or “*Matai*” of the Southern Island. Wood good, white, tough.
258. **P. dacrydioides.**—Hector and Buchanan mention as “*Dacrydium?*” the “White Pine” of Matura, which differs from the “Kahi-Katea” of the ‘New Zealand Flora,’ in being a taller stronger tree, with upright foliage and bright-red berries. Elsewhere, the same observers remark that *P. dacrydioides* has two distinct varieties:—
1. A tall tapering tree, common in the Northern Island.
  2. A dense round-headed tree, common near Dunedin, with the other.
- The remark in the ‘Handbook’ that Otago specimens have hard close wood arose from an error of Mr. Buchanan; it should apply to *D. Colensoi*. Colenso says the leaves of *P. dacrydioides* are certainly not used for eel baskets, but those of *P. spicata* may be.
258. **Dacrydium cupressinum.**—Hector and Buchanan speak confidently of the west coast Otago *D. cupressinum* being different from that of the east coast, having bright-green plumose more upright branches drooping at the points. Wood close and heavy, like that of *D. Colensoi*.
259. **D. Colensoi.**—Sounds and exposed islets of the west coast of Otago, *Hector and Buchanan*. Of this also there are two forms, a more slender western and stiffer-branched eastern.
259. **Phyllocladus trichomanoides.**—Bark used to dye yellow in Otago.
260. **P. alpinus.**—Regarded by Hector and Buchanan as a form of *P. trichomanoides*.

## CLASS II. MONOCOTYLEDONS.

### ORDER I. ORCHIDÆ.

262. **Earina mucronata.**—Chatham Island, *W. Travers*.
267. **Caladenia? bifolia.**—Referred to *Chiloglottis* (as *C. Traversii*) by Mueller in his ‘Chatham Island Florula,’ and with much reason; it differs slightly from that genus in the slender habit, less arched upper sepal, almost sessile lip, and small glands. It is certainly much nearer *Chiloglottis* than *Caladenia*, and on a revision of the former genus its character should probably be modified so as to admit it.
- Chatham** Island, *W. Travers*.
268. **Pterostylis Banksii.**—Chatham Island,  $\alpha$  and  $\beta$ , *W. Travers*.

### ORDER II. IRIDEÆ.

269. **Libertia ixioides.**—Chatham Island, *W. Travers*.

ORDER IV. **PANDANEÆ.**

Page

275. **Freycinetia Banksii.**—Northern parts of the Middle Island.

ORDER V. **TYPHACEÆ.**

276. **Typha angustifolia.**—Middle Island.—Mr. Kirk doubts the “Raupo” of the natives being identical with this. It may be the *T. latifolia*, which he is the first to discover in the island.

After *T. angustifolia*, add—

276. 2. **T. latifolia**, *Linn.* A larger coarser plant than *T. angustifolia*. Male and female catkins contiguous.

**Northern** Island: swamps between Cape Horn and Titirangi Maukeau Harbour, *Kirk.*

277. **Sparganium simplex.**—Scape sometimes with 1 or 2 branches.

ORDER VI. **NAIDEÆ.**

278. **Lemna minor.**—Northern Island, *Kirk.*
279. **Potamogeton heterophyllus.**—The true plant has been found by Mr. Kirk in the Auckland district, and in the Waikato by Mr. Travers. Mr. Kirk informs me that he has also found *P. oblongifolius*, but neither *gramineus* nor *compressus*.
280. After **Zannichellia**, insert—

6. **ZOSTERA**, L.

Slender, creeping, grassy-leaved marine plants. Spathies adnate to the inner face of the leaves at their bases. Stamens and ovaries inserted in 2 rows on the face of the flat thin spadix. Flowers monœcious. Perianth 0. Male flower a sessile 1-celled anther with tubular pollen. Female flower an ovoid ovary, with 1 filiform style and 2 stigmata, 1 cell and 1 pendulous ovule. Fruit a utricle. Seed pendulous, albumen 0; radicle large, with an inflexed cotyledon lodged in a slit in its side.

1. **Z. marina**, *Linn.* Leaves 6–14 in. long, variable in length and breadth,  $\frac{1}{12}$ – $\frac{1}{3}$  in. with numerous faint nerves. Flowers not seen.

**Northern** Island: Waitemata, *Kirk.* A narrow-leaved form, perhaps *Z. angustifolia*, Roth. (Temperate seas, northern and southern.)

ORDER VII. **LILIACEÆ.**

281. **Rhipogonum scandens.**—Chatham Island, *W. Travers.*
281. **Cordyline.**—The New Zealand species have been referred to a new genus *Dracænopsis*, by Planchon, but I think on insufficient grounds.
281. **Cordyline australis.**—I am indebted to Mr. Buchanan for excellent sketches of this plant, at all stages of growth, and full descriptions, made in

Page

various parts of the Otago province, where it is common. Its average height is 20–30 ft. and the trunk 10–18 in. diameter, though sometimes reaching 3 ft. diameter; it branches repeatedly and soon decays. The leaves form large tufts at the ends of the branches, amongst which the dense terminal panicles form conspicuous white drooping masses as large as the human head. The plants vary much in amount of branching, appear to grow rapidly, often root from the side of the trunk when this is inclined or prostrate, and are with difficulty extirpated.—Whether this is the same as the Bay of Islands plant, which, I think, has an erect loose panicle, is doubtful.

As this sheet was going to press, I received the following very full and valuable communication regarding the *Cordylines* from Dr. Hector, F.R.S.

“There are, I believe, 7 distinct *Cordylines* in the island.

“1. *C. AUSTRALIS*. Ti-rahau.

“2. *C. BANKSII*. Ti Ngahere.

“3. *C. PUMILIO*. Ti-rauriki. Sessile; blue flowers.

“4. *C. STRICTA*? Ti-parae. Leaves rigid, with fine serratures on the margin. Stem about 1 in. diameter and 7–9 long, droops, and throws off heads irregularly. Flowers and berries white, but in a sparse scape like *C. Pumilio*.” (This seems to agree with *C. Banksii*.—*J. H.*)

“5. *C. INDIVISA*. This is the broad-leaved deep-green *Ti*, with red veins, a single head, and long elegant flowers, that Forster found in Dusky Bay. The leaf has a slight resemblance to the true *Toii* of Colenso, which has led to the confusion no doubt.

“6. *C. sp.*? *Toii*. A large tree with many heads and huge broad massive leaves, yellowish with yellow and red veins and ponderous inflorescence with long bracts and black shiny seeds. This is the *Ti* that the natives use for mats, etc. The portion of the description of the ‘Handbook’ which refers to *C. indivisa*, and which you got from Colenso, applies to this plant.” (I have no Dusky Bay specimens of Forster’s plant, but Colenso’s agrees well with Forster’s figure in the British Museum.—*J. H.*)

“7. *C. sp.*? *Ti-tawhiti*. The *Ti* which is cultivated by the natives in the Upper Whanganui district; it has a long dark-green flexible leaf and thick flexible pulpy stem, which they propagate by layers. It grows rapidly. I have seen young plants only of this, and do not feel so certain of it as of the others.”

281. *C. indivisa*.—Common in Bligh’s Sound, *Hector and Buchanan*.

282. *C. Pumilio*.—In last line of description, *for* bracts *read* pedicel.

283. *Dianella intermedia*.—I have seen no specimens from the south of Nelson Province.

283. *ASTELIA*.—Mr. Kirk, of Auckland, sends me the following valuable notes on this genus, but, not being in all cases accompanied with specimens, I am not positive of the identifications.

“1. *A. CUNNINGHAMII*. Berries fine purple, black, handsome. Flowers March, April (before *A. Banksii*); fruit January–March.

“2. *A. sp.* Leaves 1–9 ft. long, margins flat, 2–4½ in. broad, erect. *Female* scape 6–20 in. high, stout, 1½ in. diameter. Flower dark-green.

Page

Perianth campanulate. Berry deep orange, 3-celled, with 3-lobed stigma, clasped by the perianth, which also becomes orange-yellow. Seeds large, angled.—A striking plant, not uncommon in swampy gullies in Auckland district. Flowers October, November; fruit July.”—(This must be either *A. nervosa* or a near ally of that plant. Mr. Colenso has sent imperfect specimens? from Bream Bay.)

“3. *A. SOLANDRI*. Flowers January and February; fruit May, bright-crimson.

“4. *A. BANKSII*. Flowers April, May; fruit March, rich purple, black when fully ripe, yellowish when immature only.

“5. *A. sp.* Leaves 2–6 ft. long, pale, glabrous or slightly silky, margin not recurved. *Male*: Panicle silky, bracts long, slender. Perianth silky; segments narrow, acuminate, recurved. Filaments subulate; anthers oblong. *Female*: Panicle more slender, very silky; branches ascending, crowded. Perianth campanulate, small; segments short, lanceolate, acuminate, externally clasping the fruit. Berry large, globular, 3-celled, deep crimson. Seeds angled.—Hilly forests, rarely epiphytal. Flowers March, April; fruit February. Easily distinguished from *A. Cunninghamii* and *A. Banksii* by its green leaves, slender female panicle, large crimson flower, and terrestrial habit.”—(I do not see how this is to be distinguished by the above description from *A. Banksii*, for the terrestrial habit is not constant; the flowers are described as small (not large), and the slenderness of the female panicle and colour of berry are not very good characters.

284. An *Astelia*, referred to *A. Cunninghamii* by Mueller (Chatham Island, *W. Travers*), seems identical with the Oahu *A. Menziesii* in the form and structure of the bract, fruiting panicle, conic-ovoid fruit, and in the terete hardly angled seeds, with a brittle testa. It is certainly not *A. Cunninghamii*, which has sharply-angled seeds, thick hard testa, and oblong-ovoid berry.

284. *A. nervosa*.—Dusky Bay, *Hector*. Probably two species are included under this, one with the berry sunk in the calyx tube, the other with a much larger, partially exserted berry.

286. *Anthericum Hookeri*.—Descends to the sea level on the east coast of Otago, *Hector*.

286. *Phormium tenax*.—Chatham Island, *W. Travers*.—*Hector* and Buchanan distinguish two Otago plants:—

1. Very robust. Flowers dark red. Capsules erect, 3-gonous.

2. Slender. Leaves drooping, greenish, narrow. Capsules much twisted, terete, 4 in. long.  $\frac{3}{4}$  in. diameter. This is more common on the west coast. In another communication, Dr. Hector alludes to a S.W. coast species with globular capsules.

#### ORDER VIII. PALMEÆ.

288. *Areca sapida*.—Middle Island, abundant in Banks's Peninsula and on the west coast of the Nelson and Canterbury provinces. Chatham Island, *W. Travers*. The flowers are dingy purplish in a specimen now flowering in the Royal Gardens, Kew. (October, 1866.)



## ORDER IX. JUNCÆÆ.

Page

289. *Juncus vaginatus*.—Middle Island ; Otago, *Lindsay*.  
 290. *J. planifolius*.—Chatham Island, *W. Travers*.  
 291. *J. novæ-Zelandiæ*.—Canterbury, Mount Harper, *Haast*.  
 291. *Rostkovia gracilis*.—Canterbury Alps, slopes above Browning's Pass, alt. 5000 ft., *Haast*.  
 292. *Luzula campestris*.—Chatham Island, *W. Travers*.

## ORDER XI. CYPERACEÆ.

297. After *Cyperus ustulatus*, add—

2. *Cyperus tenellus*, Linn. fil. A small, very slender, tufted annual. Culms numerous, capillary, 2 in. high. Leaves small, setaceous. Spikelets 1-3, near the apex of the culm, large for the size of the plant,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, oblong, obtuse, very much flattened. Scales 12-20, oblong-lanceolate, obtuse or apiculate, green with red-brown at the base, and hyaline margins, deeply grooved. Nut minute, 3-gonous, almost perfectly smooth. Stigmas 3.

**Northern** Island: abundant in the Newton and Dedwood districts, Auckland, *Mr. Kirk*. (West Australia, South Africa.)—A beautiful little plant, resembling an *Alepyrum*, probably introduced both into Swan River and New Zealand.

301. *Eleocharis gracilis*.—Mr. Carruthers, of the British Museum, has done me the service of comparing a series of New Zealand specimens with Brown's *E. gracilis*, and informs me that none agree, but that most of them may be referred to obtuse-scaled forms of Brown's *E. acuta*, from which however they further differ in the scales not being keeled. Its best character is the truncate mouth of the sheath with a foliaceous mucro. My var. *gracillima*, again, is a very different plant, with an oblique mouth to the sheath and broad pale small spikelets. The two species may be diagnosed as follows:—

2. *E. acuta*, Br., var. *platylepis*. Culms tufted, stout or slender, 4-18 in. high; mouth of sheath truncate with a foliaceous mucro. Spikelet very variable in length, ovoid oblong or cylindric, acute or obtuse; scales numerous, broad, rounded at the apex, convex, dark brown with broad scarious margins. Nut obtusely 3-gonous or compressed; bristles 4-8, longer than the nut.—*E. gracilis*, Fl. N. Z. and Tasman., not of Brown; *E. subspacelata*, Steudel.

**Northern, Middle, and Chatham** Islands. (Australia, Tasmania.)

2. *E. gracillima*, Hook. f. Culm very slender, 4-10 in. high, from a stout or slender creeping scaly rhizome; mouth of sheath oblique, scarious. Spikelet short, ovate; scales few, oblong, obtuse or subacute, pale and scarious. Nut obtusely 3-gonous or compressed; bristles 8, longer than the nut.—*E. gracilis*, var. *gracillima*, and var. *radicans*, Fl. N. Z.

**Northern, Middle, and Chatham** Islands: not so common as *E. acuta*.

303. *Desmoschœnus spiralis*.—Chatham Island, *W. Travers*.

- Page  
 307. **Lepidosperma tetragona**.—Otago, *Lindsay*.  
 313. **Carex stellulata** is a native of the Australian Alps.  
 313. **C. appressa**.—Chatham Island, *W. Travers*.  
 315. **C. Forsteri**.—Chatham Island, *W. Travers*, according to Dr. Mueller. I have seen no specimens.  
 316. **C. trifida**.—Chatham Island, *W. Travers*.—It is not found in the Northern Island, Totara-nui being in the Middle Island.  
 316. **C. Neesiana**.—Add Middle Island, in which is Totara-nui of Banks.  
 317. **C. Lambertiana?**—Chatham Island, *W. Travers*, a form with several female spikes; specimens indifferent. Add Middle Island, in which is Banks's Totara-nui.

## ORDER XII. GRAMINEÆ.

321. **Hierochloe redolens**.—Add syn. *H. Banksiana*, Endl.; and *H. racemosa*, Trin.  
 323. **Paspalum tenax**, *Trin. Diss.* ii. 122, described as a New Zealand plant, is quite unknown to me.  
 322. **Agrostis pilosa**.—Chatham Island, *W. Travers*.  
 331. **Arundo conspicua**.—Add syn. *A. Richardii*, Endl.; and to habitats, Chatham Island, *W. Travers*. To this also should probably be referred *Kampmannia Zelandiæ* and *Dichelachne procera*, Steudel.  
 331. **Phragmites communis**, *Fries*, a common European reed, also found in Australia and Tasmania, has been, as Dr. Mueller informs me, found at Canterbury by Dr. Haast. It is a large coarse grass, 4–8 ft. high, with a long dense purple panicle, as in *Arundo conspicua*, but the lower flower of each spikelet is male; the glumes are silky and awns short.  
 332. **Danthonia Cunninghamii**.—For uplands near Otago, read Chain hills, Otago.  
 334. **Deschampsia cæspitosa**.—Chatham Island, *W. Travers* (fid. *F. Mueller*).  
 337. In Key to Poa, under 9. *P. Lindsayi*, for 2–4 in., read 3–6 in., and for Leaves flat, read Leaves flat or involute.  
 337. **Poa imbecilla**.—Add syn. ? *P. hypopsila*, Steud.  
 338. **P. foliosa** is often difficult to distinguish from *Festuca littoralis*.  
 341. **Festuca littoralis**.—Chatham Island, *W. Travers*. A form with pubescent empty glumes.

## CLASS III. CRYPTOGRAMIA.

## ORDER I. FILICES.

347. After Tribe VII. enter **Marattiæ**.

Page

348. **Gleichenia dicarpa**.—Chatham Island, *W. Travers* (*F. Mueller*).
348. After 4. *G. flabellata*, add—  
 5. **G. dichotoma**, *Willd.* Stipes zigzag, repeatedly 2–3-chotomous, ultimate branches bearing a pair of forked pinnæ; a pair of pinnæ also arises from the base of the forked branches; pinnæ lanceolate, acuminate, pinna-tifid; segments linear, obtuse or emarginate, glaucous below. Capsules 10–12, exposed.—Hook. Sp. Fil. i. 12. *G. Hermannii*, Br.
- Northern** Island: Hot springs, Karapiti, *Hochstetter*; and at Rotamahaua, *Mair*. A most abundant tropical fern all over the globe. Curiously enough, Forster (as stated in the Handbook) gives New Zealand as a habitat of this plant, where, however, he never saw it in all probability, and erroneously describes the roots as eaten.
349. **Cyathea dealbata**.—Chatham Island, *W. Travers*.
349. **C. medullaris**.—Chatham Island, *W. Travers* (*C. Cunninghamii*, F. Muell. Veg. Chatham Island, 657).
350. **C. Cunninghamii**.—Colenso assures me that this was not found at the Bay of Islands, but given by himself to A. Cunningham.
351. **Dicksonia squarrosa**.—Chatham Island, *W. Travers*.
354. **Hymenophyllum dilatatum**.—Fronde sometimes 24 in. long, *Logan*.
354. **H. crispatum**.—This name should give place to **H. Javanicum**, *Sprengel*, which is of earlier date.
354. **H. polyanthos**.—Fronde sometimes 10 in. long, *Logan*.
355. **H. flabellatum**.—Chatham Island, *W. Travers*. Mr. Logan sends specimens 9 in. long.
355. **H. æruginosum**.—This is considered distinct from the Tristan d'Acunha plant, in Hook. Synops. Fil., and Mr. Colenso's name of *H. Franklinianum* confirmed to it. I must confess my inability to distinguish it. Mr. Kirk informs me that it is found at Hunua, 25 miles from Auckland.
355. **H. Lyallii**.—This is referred to *Trichomanes*, in Hook. Synops. Fil. It is found at Hunua-Huia, Auckland.—*Kirk's MSS.*
355. After *H. Lyallii*, add—  
 16. **H. ciliatum**, *Swartz*. Rhizome 1–2 in. long. Frond oblong, acuminate, 3-pinnatifid, 2–6 in. long, 1–2 in. broad, main rachis broadly winged throughout, ciliated; lower pinnæ oblong or rhomboid, central part undivided. Segments numerous, spreading, linear, simple or forked. Involucres 2–12 on a pinnule, at the apices of the segments, immersed, suborbicular; valves divided halfway down, ciliated.—Hook. Synops. Fil. 63.
- Middle** Island: Nelson, *Travers*. Closely allied to *H. æruginosum*. (America, Africa.)
356. **Trichomanes reniforme**.—This has been discovered in Australia.
356. **T. strictum**.—Mr. Baker regards this as the true common tropical *T. rigidum*, *Swartz*, and *T. elongatum* as a variety of it.
357. **T. venosum**.—Chatham Island, *W. Travers*.

Page

357. **T. Malingii**.—Francis Joseph Glacier, alt. 7000 ft., *Haast*.
359. **Lindsæa linearis**.—Colenso informs me that this is very local in the Northern Island.
360. **Adiantum Cunninghamii**.—Chatham Island, *W. Travers*.
362. **Hypolepis distans**.—Mr. Colenso informs me that Mr. Edgerly was never at Cape Maria Van Diemen, but gathered this plant at Hokianga.
362. **Cheilanthes tenuifolia**, var. *Sieberi*.—This is usually kept as a distinct species.—*C. Sieberi*, Kunze.
363. **Pteris aquilina**, var. *esculenta*.—Chatham Island, *Captain Anderson*.
363. **P. scaberula**.—Chatham Island, *W. Travers*.
363. **P. incisa**.—Chatham Island, *Captain Anderson (F. Muell.)*.
366. **Lomaria procera**.—Chatham Island, *W. Travers (L. Capensis, F. Muell. Veg. Chatham Island, 74)*.
367. **L. pumila**.—Mr. Logan thinks this is connected by intermediate forms with *L. lanceolata*.
367. After 6. *L. vulcanica*, add—  
 6a. **L. dura**, *Moore in Gard. Chron.* 1866, 290. Rhizome erect. Frond tufted. Barren fronds lanceolate, 8–10 in. high,  $1\frac{1}{2}$ –2 broad, erect, rigid, pinnatifid to the rachis; sinus acute; segments alternate, contiguous, lanceolate, falcate, finely serrulate, lower decreasing in size, obtuse; veins evident. Fertile fronds as rigid and broad as the sterile; segments becoming involute, densely covered with fruit.—*L. rigida*, J. Sm. Ferns, Brit. and Foreign, 290.  
**Chatham Island** (fide *Smith and Moore*).—I have seen no specimen.
368. **L. discolor**.—Chatham Island, *W. Travers*.
370. **Doodia caudata**.—Colenso thinks there must be a mistake in describing this as fragrant, and that *Polypodium pustulatum* is referred to.
371. **Asplenium obtusatum**.—Chatham Island, *W. Travers (A. marinum, F. Muell. in Veg. Chatham Island, 66)*. A var. with pinnatifid lobes.
372. **A. falcatum**.—Chatham Island, *W. Travers*. This is the *A. Forsterianum*, Colenso in Tasman. Phil. Journ. ii. 171, according to Moore, but Mr. Colenso refers his plant to *A. caudatum*. The rhizome is tufted, not creeping as described by error.
372. **A. Hookerianum**.—I have another variety of this plant from Mount Mania, Whangarei, sent by Mr. Mair; it has a small slender flaccid oblong frond, 1–2 in. long, with narrow linear-obovate substipitate entire ultimate pinnules  $\frac{1}{8}$  in. long. I have seen but one frond.
373. **A. bulbiferum**.—Chatham Island, *W. Travers*.
374. **A. flaccidum**.—Chatham Island, *W. Travers*.
375. **A. aculeatum**, var. *vestitum*.—Chatham Island, *W. Travers*.
376. **A. oculatum**.—Chatham Island, *W. Travers*. A var. with brownish scales.



- Page  
 376. **A. coriaceum**.—Chatham Island, *W. Travers*.  
 377. **Nephrodium molle**.—I am indebted to Mr. Mair for a specimen of this.  
 378. **N. decompositum**.—Chatham Island, *W. Travers*.  
 378. Add—

6. **N. unitum**, *Brown*. Glabrous. Rhizome creeping. Stipes glabrous or slightly chaffy at the base. Frond ovate-oblong, pinnate, 1–3 ft. high, rather rigid; pinnules rather distant, spreading or ascending, narrow ensiform, very shortly stipitate, pinnatifid halfway down or lower; segments broadly ovate, acute, quite entire; veins free. Sori numerous, halfway between the margin and costa, or nearer the former; involucre glabrous.

**Northern** Island, *Sinclair*; Rotamahana, in a hot water swamp, *H. Mair*. (Tropical Australia, Asia, Africa, and America.) This is no doubt the plant alluded to by Mrs. Jones, and mentioned in the note at bottom of page 378 of this Handbook.

380. **Polypodium Grammitidis**.—Chatham Island, *W. Travers*.  
 380. **P. tenellum**.—Middle Island, Cape Farewell, *Travers*.  
 381. **P. rugulosum**.—Chatham Island, *W. Travers*.  
 382. **P. pennigerum**.—Chatham Island, *W. Travers*.  
 382. **P. pustulatum**.—Chatham Island, *W. Travers*.  
 382. **P. Billardieri** (*P. scandens*, Forst., var. *Billardieri*, Mueller, Veg. Chatham Island, 69).—Chatham Island, *W. Travers*.  
 383. **Gymnogramme leptophylla**.—Middle Island, *Lyttleton*, in crevices of rocks, *Travers*.  
 383. **Nothochlæna distans**.—Middle Island, Maiku valley, *Travers*.  
 385. **Lygodium articulatum**.—This is rare in and confined to the Northern part of the Middle Island.  
 385. **Schizæa dichotoma**.—Colenso informs me that this never grows in marshy places, but only at the base of Kaudi-trees.  
 385. **S. bifida**.—I have confounded two plants under this name, both of which occur intermixed in Cunningham's herbarium, as *S. propinqua*; they are:—

2. **S. bifida**, *Swartz*. Stipes often 2-fid, more or less flattened, concave on one surface with or without a prominent rib,  $\frac{1}{20}$ – $\frac{1}{10}$  in. broad, slightly rough. Fruiting limb  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, broad, of 8–16 pairs of ascending pinnules,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, whose edges are fringed with very slender flexuous hairs.

**Northern** Island, Bay of Islands, *A. Cunningham*, etc., and perhaps elsewhere. (Australia, Pacific Islands, India, S. America.)

3. **S. fistulosa**, *Labillardière*. Stipes simple, terete, deeply grooved,  $\frac{1}{40}$ – $\frac{1}{20}$  in. diam., smooth. Fruiting limb  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, narrow, of 8–12 pairs of spreading pinn  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, whose edges are torn and toothed.

Var. *β. australis*. Much smaller; frond 1–3 in. high.—*S. australis*, Gaudichaud; *S. pectinata*, Homb. and Jacq.

**Northern** Island, Bay of Islands, *A. Cunningham*, etc. **Middle** Island, Canterbury, *Haast*; Otago, *Hector and Buchanan*. Var. *β. Lord Auckland's* group, *D'Urville's Erped.*, etc. (Australia, Chili, Falkland Islands.)

Page

386. *Ophioglossum vulgatum*.—Sometimes 3 and even 4 scapes arise from the root.
387. *Botrychium cicutarium*.—Chatham Island, *W. Travers*.
389. *Lycopodium varium*.—Chatham Island, *W. Travers*.
389. *L. Billardieri*.—Chatham Island, *W. Travers*.
389. *L. densum*.—Chatham Island, *W. Travers*.
391. *L. volubile*.—Chatham Island, *W. Travers*.
391. *Tmesipteris Forsteri*.—Colenso distinguishes between *T. Forsteri*, with acute or acuminate segments, and *T. truncatum*, Br., with truncate emarginate segments, both of which grow in the islands, and which he affirms are distinct in habit and habitat. In the herbarium I am quite unable to distinguish the numerous intermediate forms.
391. *Psilotum triquetrum*.—Rangitoto Island, near Auckland, on *Metrosideros tomentosa*, *Colenso*.

## ORDER IV. MUSCI.

437. *Mielichoferia longiseta*.—Mitten informs me that the New Zealand differs from the American plant, and is this—

1. *M. tenuiseta*, *Mitten*. Stems  $\frac{1}{2}$ –1 in. long. Leaves glossy, on the sterile branches oblong-lanceolate acute; nerve percurrent; apex serrate; cells narrow elongate; perichætil ovate, acute, serrulate,  $\frac{1}{2}$ -nerved. Fruit-stalk elongate, red. Capsule pyriform; operculum large, mamillate; teeth (inner) narrow, smooth, united into a short membrane. Inflorescence monœcious, *Mitten*.

**Middle Island:** Alps of Canterbury, *Sinclair and Haast*.—Differs from the Andean plant in the narrower leaves and smooth teeth.

## ORDER V. HEPATICÆ.

The following is a new arrangement of the New Zealand genera of *Hepaticæ*, by Mitten, which will be of great use in aiding the student in determining the genera of this most difficult Order :—

## A. Foliosæ.—Leaves distinct.

\* *Leaves succubous; base with the lowest angle on the upper side of the stem.*

a. *Perianth leafy.*

1. *Fruit terminal.*

3. *PLAGIOCHILA*. Perianth compressed; stems erect or ascending; stipules 0.

4. *LEIOSCPHUS*. Perianth compressed; stems procumbent, stipulate.

2/1. *TEMNOMA*. Perianth above 3-gonous, truncate.

2/2. *CHANDONANTHUS*. Perianth tubular, many-plicate; mouth open; stems erect or ascending.

5. *LOPHOCOLEA*. Perianth 3-quetrous; angles often alate; mouth 3-lipped, closed; stems procumbent, stipulate.

5/1. *TRIGONANTHUS*. Perianth 3-gonous; mouth contracted; stems procumbent, stipulate near the fruit.

2. JUNGERMANNIA. Perianth tubular; mouth contracted, dentate; stipules 0 or present on the stem.

2/3. SOLENOSTOMA. Perianth obovate, 5-plicate above, with a tubular beak.

2. *Fruit lateral.*

10. ADELANTHUS. Stems erect, nodding; stipules 0.

8. CHILOSCYPHUS. Stems procumbent, stipulate.

9. PSILOCLADA. Stems procumbent; leaves and stipules deeply cleft.

b. *Perianth a descending fleshy bag.*

1. *Fruit terminal.*

11/1. TYLIMANTHUS. Stems erect or ascending; leaves nearly entire; stipules 0.

12/2. ACROBOLBUS. Stems procumbent; leaves 2-fid; stipules small or 0.

11/3. LETHOCOLEA. Stems procumbent; leaves entire; stipules 0.

11/4. BALANTIOPSIS. Stems procumbent, stipulate.

2. *Fruit lateral.*

11/5. MARSUPIDIUM. Stems erect or ascending; stipules 0.

12. SACCOGYNA. Stems procumbent, stipulate.

\*\* *Leaves vertical; base crossing the stem transversely.*

a. *Perianth none.*

1. *Fruit terminal.*

1. GYMNOTRITIUM.

b. *Perianth leafy.*

1. *Fruit terminal.*

16. ISOTACHIS. Leaves and stipules nearly equal; perianth tubular; mouth connivent.

6. SCAPANIA. Leaves complicate; stipules 0; perianth compressed in plane with leaves; mouth truncate.

7. GOTTSCHEA. Leaves with adherent lobe; perianth overlaid by involucre leaves.

2. *Fruit lateral.*

15. LEMBIDIUM. Stipulate. Perianth from the lower part of stem, 3-gonous.

\*\*\* *Leaves incubous; base with the lowest angle on the under side of the stem.*

† *Without an inferior lesser lobe.*

a. *Perianth leafy.*

1. *Fruit terminal.*

18. SENDTNERA.

2. *Fruit lateral.*

18/1. LEPEROMA. Leaves and stipules deeply cleft; calyptra adnate with the involucre leaves; fruit near the top of the stem.

13. LEPIDOZIA. Leaves and stipules usually deeply cleft; perianth near the base of the stem, 3-gonous.

14. MASTIGOBRYUM. Leaves and stipules entire or with their apices truncate, dentate; perianth in the lower part of the stem, 3-gonous.

†† *With an inferior lesser lobe (lobule).*

a. *Lobule plane.*

1. *Fruit terminal.*

20. RADULA. Perianth compressed in plane with leaves; mouth truncate; stipules 0.

- Page 22. LEJEUNIA. Perianth obovate, 3-6-plicate; mouth a tubular beak.  
 17. TRICHOCOLEA. Calyptra and involueral leaves combined; leaves capillary, multifid.

2. *Fruit lateral.*

- 18/2. MASTIGOPHORA. Perianth ventricose, subcampanulate.  
 21. MADOTHECA. Perianth contracted at the mouth, compressed, plicate.

b. *Lobule inflated-galeate.*

23. FRULLANIA. Perianth 3-6-plicate or terete, with a tubular beak.  
 19. POLYOTUS. Involueral leaves overlying each other, adnate below.

B. *Frondosæ*.—Without distinct leaves.

a. *Perianth complete.*

24. FOSSOMBRONIA. Perianth on upper side of frond; leaves angular.  
 25. NOTEROCLADA. Perianth near the apex; leaves rounded.  
 26. PETALOPHYLLUM. Perianth on upper side of frond; frond continuous.  
 27. ZOOPHIS. Perianth lateral; frond continuous, with alternate lateral projections, tipped with cilia.  
 28. PODOMITRIUM. Perianth from the under side of a continuous frond.  
 29. STEETZIA. Perianth on upper side of a continuous frond.

b. *Perianth none.*

30. SYMPHYOGYNA. Calyptra on upper side of often stipitate frond; nerve narrow.  
 31. METZGERIA. Calyptra on under side of continuous frond; nerve narrow.  
 32. SARCOMITRIUM (ANEURA). Calyptra lateral; frond composed almost entirely of thickened nerve.

C. *Carnosæ*.—Fronds fleshy, with oblique scales on under side.

a. *Fruits imbedded in substance of the frond.*

40. RICCIA.

b. *Fruits terminal on the under side of frond.*

38. TARGIONIA. Involucre 2-valved.

c. *Fruits many on the under side of a stalked peltate receptacle.*

33. PLAGIOCHASMA. Perianths opening laterally.  
 34. MARCHANTIA. Perianths opening downwards.  
 35. DUMORTIERA. Perianth 0; involucre opening by a slit.  
 36. REBOULIA. Perianth 0; involucre opening by 2 valves.  
 37. FIMBRIARIA. Perianth split into bands cohering at their apices.

D. *Anthocerotæ*.—Frond fleshy, without scales beneath.

39. ANTHOCEROS.

Mr. Mitten has further favoured me with the following valuable remarks on the genera:—

3. **PLAGIOCHILA.** Add after 16. *P. deltoidea*:—

507. *P. læta*, Mitten. Stem nearly simple, elongate, ascending, curved, with innovations below the perianth. Leaves patent, nearly orbicular, convex above; dorsal margin recurved towards the apex; ventral ciliate; cells small, orbicular with narrow interstices. Perianth oblong-obovate; mouth truncate, sparingly toothed.



Page  
507. **Northern Island, Colenso.** Differs from *P. deltoidea* in the more oblong perianth and rounder softer leaves.

2/1. **TEMNOMA**, *Mitten* (from the truncate mouth of the perianth).—To this are referred *Jungermannia pulchella* and *quadrifida* (p. 504), together with some other not New Zealand plants.

2/2. **CHANDONANTHUS**, *Mitten*.—From the open plaited mouth of the perianth, includes *Jungermannia squarrosa* (p. 503) of New Zealand, and others.

5. **LOPHOCOLEA**.—Characterized by its 3-gonous closed perianth. *L. Colensoi* (p. 509) has been found in fruit, and proves to be a *Chiloscyphus*.

5/1. **TRIGONANTHUS**, *Spruce*, approaches *Lophocolea*, but the perianth is different and the stipules usually wanting on the barren stems. The New Zealand species is *J. dentata* (p. 503).

2/3. **SOLENOTOMA**, *Mitten*, includes *Jungermannia inundata* (p. 502), and *rotata* (p. 503). The perianth in this genus adheres to the base of the uppermost leaves.

8. **CHILOSCYPHUS**.—*Lophocolea Colensoi*, p. 509, should be transferred here; it resembles *C. coalitus*, but is larger, more succulent, the dorsal angles of the leaves are more widely separate; perianth short, campanulate; lips toothed, not exerted beyond the leaves.

11/1. **TYLIMANTHUS**, *Mitten*, here proposed for *Gymnanthe saccata* (excl. syn. *Urvilleana*) (p. 520) and another,—the name *Gymnanthe* being too near *Gymnanthes* and *Gymnanthus*.

11/2. **ACROBOLBUS**, *Lehm. and Lindb.*, includes *Gymnanthe unguiculata* and *G. lophocoleoides* (p. 519). (In description of *unguiculata*, for leaves obscurely 12-lobed read 2-lobed.)

11/3. **LETHOCOLEA**, *Mitten*, consists of *Gymnanthe Drummondii*, p. 519.

11/4. **BALANTIOPSIS**, *Mitten*, includes *Gymnanthe*, *G. diplophylla* (p. 519), and the following.

3. **B. erinacea**, *Mitten*. Lobes of the leaf free at the base, inferior broadly ovate, notched at the apex with 2 teeth, both margins ciliated; superior lobe nearly orbicular, notched at the apex and ciliate. Stipule unequally 6-partite; laciniae toothed and ciliate.—*Mitten*.

**New Zealand, Lyall.**

11/5. **MARSUPIDIUM**, *Mitten*.—To this genus belong *Gymnanthe setulosa* (p. 519), and the true *G. Urvilleana*, which was confounded with *G. saccata* at p. 520.

2. **M. Knightii**, *Mitten*. Stem short, simple, curved. Leaves largest towards the middle of the stem, patent or appressed, orbicular or subquadrate; anterior margin entire, ending in a spine; apex subtruncate; posterior margin sparingly toothed. Sac oblong on a very short branch, to which it is

attached at about the middle of its length. Fruitstalk basal. Capsule elongate.

**New Zealand, Knight.**

3. **M. Urvilleana**.—*Gymnanthe*, Tayl. in Fl. Antaret. 153. Rhizome creeping. Stems tufted,  $\frac{1}{2}$ –2 in. high, erect, tips nodding. Leaves spreading or appressed and imbricate, nearly round, with an indistinct notch or with one or two short teeth at their tops. Involucre attached to the lower parts of the stem by its side, rooting. Capsule on a long stalk, ovoid.—*Plagiochila Urvilleana*, Mont. in Voy. au Pôle Sud, t. 16. *Jung. abbreviata*, Hook. f. and Tayl. in Lond. Journ. Bot. 1844, 374; Syn. Hepat. 647 (*Plagiochila*).

**Northern Island, Colenso.** **Lord Auckland's group, D'Urville's Expedition, J. D. H., Col. Bolton.**—Less than *G. saccata*, and in its mode of growth more like some *Plagiochilæ*, e. g. *P. ansata* and *P. circinalis*.

15. **LEMBIDIUM**, Mitten.—This genus is established for the *Micropterygium nutans* (p. 526), a very peculiar plant, destitute of flagella; the stem is clothed with a vesicular coat.

18/1. **LEPEROMA**, Mitten, is proposed for *Sendtnera ochroleuca*, *S. attenuata*, which may be a variety of the same, and *S. Scolopendra* (p. 528).

18/2. **MASTIGOPHORA**.—Quite different from *Sendtnera* in its lateral fruit, perianth not overlaid, and free calyptra; the habit is more that  
508. of *Madotheca*.

In character of *Lophocolea*, after, Fruit terminal, add, rarely lateral. Lips  
519. of perianth 3, closed.

**Gymnanthe lophocoleoides**.—Mr. Mitten has furnished me with a description of the involucre, which is about as long as the uppermost leaves, with scattered pale rootlets.

5 **G. setulosa**.—Add, Antheridia covered by minute scale-like leaves, on slender branches from the lower part of the stem.

520. **G. saccata**.—*G. Urvilleana* (*Plagiochila*, Mont.) proves to be a different species. See above, under *Marsupidium*.

521. **Lepidozia capilligera**.—Mr. Mitten informs me that the perianth is elongated, its mouth toothed.

523. **L. albula**.—Mr. Mitten suspects that this is nothing but *L. ulothrix*.

524. **Mastigobryum monilinerve**.—Add—

**Middle Island:** Dusky bay, *Menzies*; Otago, *Hector*.

525. **M. decrescens**.—Mr. Mitten has little doubt but that this is *M. novæ-Hollandiæ*.

526. **ISOTACHIS**.—Place "almost trifarious" after "Leaves."

529. Add—

5. **P. allophylla**, and 6. **P. reticulata**, from p. 538, where they are described as *Frullaniæ*.

Page

531. Erase the description of *Radula dentata*, and substitute :—Stems short,  $\frac{1}{2}$  in. long, pinnate. Leaves roundly ovate, with a short point; lobule nearly square, appressed; leaves of the branches with 3 or 4 strong teeth on the dorsal margin; lobule saccate. Perianth narrow, very long, compressed above. Capsule cylindric.—*Lejeunia dentata*, Mitten in Fl. N. Z. ii. 159.

**Northern** Island, *Stephenson in Hb. Mitten*; Auckland, *Sinclair*.—The figure in Fl. N. Z. was taken from fragments of the branches.

531. **LEJEUNIA**.—The stipules are sometimes absent.

537. After *Frullania pentapleura*, add—

**F. rostellata**, *Mitten*. Small, creeping, appressed, irregularly pinnate. Leaves orbicular-ovate; lobule compressed, decurved, galeate, half the length of the leaf; stipules broadly obovate, with a small notch. Involucral leaves spreading, obtuse, united below with the stipule, which is deeply cleft with lanceolate segments. Perianth broadly obovate, with a long tubular beak, covered with short laciniae, flattened on the upper side, obtusely keeled on the under.—*Mitten*.

**Northern** Island, on a *Sticta*, *Knight*.

538. Remove *F. allophylla* and *F. reticulata* to *Polyotus*, p. 531.

539. **FOSSOMBRONIA**.—For Antheridia on the “under” read “upper” surface.

540. Last line, for *Lyallii* read *Lyellii*.

545. **Marchantia tabularis**.—In fourth line of observations, etc., before “midrib” insert “dark.”

## ORDER VII. LICHENES.

Since the printing of the Lichens for this work, several papers on this Order have appeared, to which I can here only refer. They are :—Dr. Nylander's ‘Lichenes Novæ-Zelandiæ’ (Journ. Linn. Soc. Lond. Bot. ix. 244), and Dr. L. Lindsay's ‘Observations on New Lichens and Fungi, collected in Otago, New Zealand’ (Trans. Royal Soc. Edinb. xxiv. 407. t. 29, 30), and his paper ‘On a New Species of *Melanospora* from Otago’ (Trans. Bot. Soc. Edinb. viii. 426).

I am indebted to Dr. Lauder Lindsay for the following list of Lichens found in Chatham Island by W. Travers, Esq. :—

*Sticta orygmæa*, Ait.

*Sticta Urvillei*, Ait., var. *flavicans*.

*Ramalina scopulorum*, Ait.

*Cladonia aggregata*, Eschw.

*Stereocaulon mixtum*, Nylander.

## ORDER VIII. FUNGI.

602. **Agaricus (Pleurotus) euphyllus**, *Berk*. Pileus 3 in. across, finely striate and coarsely wrinkled longitudinally when dry, reniform, glabrous, pale chestnut; stipes 0 or obsolete; gills broad; interstices smooth.

**New Zealand**, *Sinclair*.

Page

611. *Hydnum Sinclairii*, Berk. Black. Pileus thin, coriaceous, somewhat zoned, radiately striate and rugose; margin irregularly lobed; stipes thin, subconfluent; processes slender, acute.

**New Zealand**, *Sinclair*.—Allied to *H. zonatum*, but differing in the black spines and pileus.

625. *Ustilago urceolorum*, Tulasne in *Ann. Sc. Nat. Ser. 3. vii. 36. t. 4. f. 7-10*. Spores black-brown, thick, oblong, angular, at length agglutinated and forming a black powder; integument thick smooth or minutely papillose.

**Northern Island**: on *Carex ternaria*, *Colenso*. (Europe, etc.)

625. *Æcidium disseminatum*, Berk. Spots 0 or effuse. Peridia scattered, short; margin lobed. Spores white?

**Middle Island**: on leaves of *Hypericum japonicum*.—Apparently quite distinct from the N. American *Cæoma Hypericastrum*, Link.

625. *Peziza (Lachnea) scutellata*, Linn. Flat, vermilion-red, pale externally, hispid towards the margin with black straight hairs.

**Northern Island**: on dead wood, *Colenso*. (Europe, etc.)

632. *Hypoxylon Colensoi*, Berk. Stroma of dense club-shaped masses, pitchy-black externally, somewhat stratified internally, rugose-punctate. Perithecia oblong.

**Northern Island**, *Colenso*.—Specimen old and imperfect, but evidently allied to *H. cænopus*, and hence representing a peculiar type. In an early state it resembles states of *Antennaria scoriadea*.

#### ORDER IX. ALGÆ.

720. After **TOLYPOTHRIX**, insert—

#### CHROOLEPUS, Agardh.

Frond of minute, erect, rigid, subsolid filaments, opaque, falling to powder; joints often contracted.

An obscure genus, belonging to the tribe *Byssoideæ*, which should follow *Oscillatoricæ* the Key, p. 646.

1. *C. aureus*, Harvey. Filaments forming soft cushion-like tufts, flexuose, irregularly branched, yellow-green brick-red or orange; articulations twice as long as broad.

**Northern Island**: on rocks and trees, *Colenso*. (Europe, etc.)—I am indebted to Mr. Berkeley for this identification; he observes that the specimens are full of dumb-bell crystals of oxalate of lime.



## LIST OF THE PRINCIPAL NATURALIZED, OR APPARENTLY NATURALIZED, PLANTS OF NEW ZEALAND.

THE rapidity with which European weeds, and especially the annuals of cultivated grounds, are being introduced into and disseminated throughout New Zealand, is a matter of much surprise to all observers, and not only to professed naturalists. It is a point of very great significance in reference to all inquiries relating to their superior powers of propagation and establishing themselves, which the plants as well as animals of some countries display, as contrasted with those of others; and when, as in the case of New Zealand, the result is the actual displacement and possible extinction of a portion of the native flora by the introduced, the facts may well arouse the interest of the most listless colonist. It is impossible for me here to enter into this subject, which, novel as it is, yet suggests a thousand curious reflections. I have touched lightly on it in an article "On the Replacement of Species in the Colonies and elsewhere" in the 'Natural History Review' of January, 1864; and I can here do no more than again call attention to the fact, that now is the time for certifying the dates of the introduction of many plants which, though unknown in the islands a quarter of a century ago, are already actually driving the native plants out of the country, and will, before long, take their places, and be regarded as the commonest native weeds of New Zealand.

The following list is compiled from many sources, and has for the most part appeared in the 'Flora of New Zealand.' Important additions have been made by various collectors, but especially by Mr. Kirk, of Auckland, who has favoured me with a list of upwards of eighty species (marked A in this catalogue) from within sixty miles of that city. The majority of these plants are British, and will be found described in any British Flora.

I am informed that the late Mr. Bidwill habitually scattered Australian seeds during his extensive travels in New Zealand; if this be true, it is remarkable how few Australian plants have naturalized themselves in the islands, considering both this circumstance and the extensive commerce between these countries.

I have added the duration to the species, to show the great contrast in this respect between the indigenous and introduced plants. Of the indigenous plants described in this work, nearly all (as in other oceanic islands) are perennial (♂); of the introduced plants, now to be enumerated, fully one-half are annual (⊙), and thirteen are biennial (♂).

### CLASS I. DICOTYLEDONES.

#### RANUNCULACEÆ.

*Ranunculus parviflorus*, L. (see p. 8). Europe, fields, etc. ⊙

## CRUCIFERÆ.

- Nasturtium officinale*, *L.* (p. 15). Europe, aquatic. (Watercress.) ♀  
*Erysimum officinale*, *L.* Europe, waste places. ⊙  
*Senebiera Coronopus*, *Poir.* (p. 15). Ditto, ditto. ⊙  
*Senebiera pinnatifida*, *DC.* (p. 15). Ditto, ditto. ⊙  
*Capsella Bursa-pastoris*, *L.* (p. 15). Ditto. (Shepherd's Purse.) ⊙  
A. *Lepidium ruderales*, *L.* Ditto, ditto. ⊙  
*Lepidium sativum*, *L.* Ditto. (Garden Cress.) ⊙  
*Alyssum maritimum*, *Willd.* Ditto. (Sweet Alyssum.) ♀  
*Cochlearia Armoracia*, *L.* Ditto. (Horseradish.) ♀  
A. *Sinapis arvensis*, *L.* Ditto, fields. (Charlock.) ⊙  
*Brassica Rapa*, *L.* Ditto, ditto. (Rape-seed.) ♂  
*Brassica Napus*, *L.* Ditto, ditto. (Turnip.) ♂  
*Brassica oleracea*, *L.* Ditto, ditto. ♂  
*Brassica campestris*, *L.* Ditto, ditto. (Swedish Turnip.) ⊙ or ♂  
*Raphanus sativus*, *L.* Ditto, ditto. (Radish.) ⊙

## CARYOPHYLLÆ.

- Gypsophila tubulosa*, *Boiss.* (p. 22). Levant. ⊙  
*Silene quinquevulnera*, *L.* Ditto, waste places. ⊙  
*Stellaria media*, *With.* Ditto, ditto. ⊙  
A. *Arenaria serpyllifolia*, *L.* ⊙  
A. *Sagina apetala*, *L.* Europe, waste places. ⊙  
*Cerastium vulgatum*, *L.* Ditto. ⊙  
*Cerastium viscosum*, *L.* Ditto. ⊙  
*Polycarpon tetraphyllum*, *L.* Ditto. ⊙  
*Spergula arvensis*, *L.* Ditto. ⊙

## HYPERICINÆ.

- A. *Hypericum humifusum*,\* *L.* Europe, heathy places. ♀

## MALVACEÆ.

- A. *Malva rotundifolia*, *L.* Europe, waste places. ♀

## GERANIACEÆ.

- A. *Geranium molle*, *L.* Europe, pastures. ⊙  
*Erodium cicutarium*, *L.* (p. 38). Ditto, waste places. ⊙

## LEGUMINOSÆ.

- A. *Ulex europæus*, *L.* Europe. (Furze, Gorse, or Whin.) ♀  
A. *Trifolium repens*, *L.* Ditto, meadows and waste places. (Dutch Clover.) ♀  
A. *Trifolium pratense*, *L.* Ditto, meadows. (Purple Clover.) ♀  
A. *Trifolium procumbens*, *L.* Ditto, waste places. ⊙

\* Inserted on Mr. Kirk's authority. It much resembles *H. Japonicum* (p. 29).

- A. Melilotus arvensis*, *L.* Europe, waste places. ♂  
*A. Medicago lupulina*, *L.* Ditto, ditto. ☉  
*A. Medicago maculata*, *L.* Ditto, pastures. ☉  
*A. Medicago denticulata*, *Willd.* Ditto, ditto. ☉  
*A. Lotus corniculatus*, *L.* Ditto, ditto. (Bird's-foot Trefoil.) ♀  
*A. Lotus major*, *Scop.* Ditto, ditches, etc. ♀  
*A. Vicia hirsuta*, *L.* Ditto, fields, etc. ☉  
*A. Vicia sativa*, *L.* Ditto, ditto. ☉ or ♂  
*A. Vicia tetrasperma*, *L.* Ditto, ditto. ☉

## ROSACEÆ.

- Alchemilla arvensis*, *Sm.* Europe, waste places. ☉  
*A. Rubus discolor*, *W. and N.* Ditto, hedges, etc. (Bramble.) ♀  
*A. Rubus rudis*, *Weihe.* Ditto, ditto. ♀  
*A. Rosa micrantha*, *Smith.* Ditto, ditto. ♀  
*A. Rosa rubiginosa*, *L.* Ditto, ditto. (Sweetbriar Rose.) ♀  
*A. Rosa canina*, *L.* Ditto. (Dog Rose.) ♀

## LYTHRARIÆ.

- Lythrum hyssopifolium*, *L.* Ditto, waste places. ☉

## ONAGRARIÆ.

- Oenothera stricta*, *L.* S. America. (Evening Primrose.) ☉

## CACTEÆ.

- Opuntia vulgaris*, *Mill.* S. America. (Common Cactus or Prickly Pear.) ♀

## CURCUBITACEÆ.

- Curcubita*\* *sp.* Cultivated by the natives ("Hue" of natives), *Colenso.* ☉

## UMBELLIFERÆ.

- A. Petroselinum sativum*, *L.* Europe, cultivated places. (Parsley.) ♂  
*A. Fœniculum vulgare*, *L.* Ditto, ditto. (Fennel.) ♀  
*A. Daucus Carota*, *L.* Ditto, ditto. (Carrot.) ♂  
*A. Pastinaca sativa*, *L.* Ditto, waste places. (Parsnip.) ♂  
*A. Scandix Pecten*, *L.* Europe, fields and waste places. ☉  
*Chærophyllum cerefolium*, *Cranz.* ☉

## CAPRIFOLIACEÆ.

- A. Sambucus nigra*, *L.* Europe, coppices, etc. (Elder.) ♀

## RUBIACEÆ.

- Sherardia arvensis*, *L.* Europe, fields, etc. ☉

## VALERIANEÆ.

*Fedia olitoria*, *L.* Europe, cornfields. (Corn Salad.) ☉

## COMPOSITÆ.

*Conyza ambigua*, *DC.* Europe, waste places. ☉

*Erigeron canadensis*, *L.* N. America and Europe, ditto. ☉

A. *Bellis perennis*, *L.* Europe. (Daisy.) ♀

*Bidens pilosa*, *L.* (p. 138). Warm Asia, etc. ☉

A. *Anthemis nobilis*, *L.* Europe, waste places. (Chamomile.) ♀

A. *Achillea millefolia*, *L.* Ditto, pastures. (Yarrow.) ♀

*Wollastonia biflora*, *DC.?* India. ☉

A. *Chrysanthemum leucanthemum*, *L.* Europe, fields, etc. (Ox-eye Daisy.) ♀

*Siegesbeckia orientalis*, *L.* India, tropical weed. ☉

A. *Senecio vulgaris*, *L.* Europe, weed. (Groundsel.) ☉

*Eclipta erecta*, *L.* India, tropical weed. ☉

B. *Carduus lanceolatus*, *L.* Europe, roadsides. (Common Thistle.) ♂

*Centaurea calcitrapa*, *L.* Ditto, fields, etc. ☉

A. *Centaurea solstitialis*, *L.* Ditto, ditto. ☉

*Lapsana pusilla*, *L.* Ditto, ditto. ☉

A. *Tragopogon minus*, *L.* Ditto, meadows, etc. ♂

A. *Thrinicia hirta*, *Both.* Ditto, dry pastures, etc. ♀

A. *Apargia autumnalis*, *Willd.* Ditto, ditto. ♀

A. *Hypochaeris radicata*, *L.* Ditto, meadows, etc. ♀

A. *Crepis virens*, *L.* Ditto, pastures, etc. ☉

*Taraxacum Dens-leonis*, *Desf.* (p. 165). Ditto, waste places. ♀

*Sonchus arvensis*, *L.* (p. 166). Ditto, cornfields, etc. (Sow-thistle.) ♀

A. *Cichorium Intybus*, *L.* Ditto, ditto. (Wild Chicory.) ♀

*Xanthium spinosum*, *L.* Ditto, ditto. (Burweed.) ☉

## PRIMULACEÆ.

*Anagallis arvensis*, *L.* Ditto, ditto. (Pimpernel, or Poor Man's Weather-glass.) ☉

## GENTIANEÆ.

A. *Erythræa Centaurium*, *Pers.* Europe, pastures. (Centaury.) ☉

## BORAGINEÆ.

A. *Lithospermum arvense*, *L.* Europe, waste places. ☉

*Cynoglossum micranthum?* (p. 197). India. ♂

## CONVOLVULACEÆ.

*Ipomœa chrysorrhiza* (*Convolvulus*, *Forst.*). The originally cultivated Kumarah of the islanders, probably a variety of the following. ♀

*Ipomœa Batatas*, *Lam.* The common Sweet Potato of the tropics, now much cultivated in New Zealand. ♀



## SOLANEÆ.

- Solanum nigrum*, *L.* (p. 200). Europe, waste places. ☉  
*Solanum tuberosum*, *L.* S. America. (Common Potato.) ㄥ  
*Physalis peruviana*, *L.* Ditto. (Cape Gooseberry, Tipareh.) ㄥ  
*Capsicum annuum*, *L.* America, cult. everywhere. (Capsicum.) ☉  
*Lycopersicum esculentum*, *Mill.* Ditto, ditto. (Tomato.) ☉  
*A. Datura Stramonium*, *L.* Europe, waste places. ☉  
*A. Lycium Barbarum*, *L.* Ditto, ditto. ㄥ

## SCROPHULARINEÆ.

- A. Verbasum Thapsus*, *L.* Europe, waste places. (Mullein.) ♂  
*A. Verbasum phœniceum*, *L.* Ditto, ditto. ♂  
*A. Veronica arvensis*, *L.* Ditto, fields, etc. ☉  
*A. Veronica serpyllifolia*, *L.* Ditto, roadsides, etc. ㄥ  
*A. Veronica agrestis*, *L.* Ditto, fields. ☉  
*A. Veronica Buxbaumii*, *Ten.* Ditto, ditto. ☉  
*Veronica officinalis*, *L.* Ditto, woods and dry places. ㄥ  
*Veronica Anagallis*, *L.* Ditto, ditches, etc. ㄥ  
*A. Digitalis purpurea*, *L.* Ditto, banks, etc. (Foxglove.) ㄥ  
*A. Linaria Elatine*, *Mill.* Ditto, cornfields, etc. ☉

## VERBENACEÆ.

- A. Verbena officinalis*, *L.* Europe, waste places. (Vervain.) ㄥ

## LABIATÆ.

- Mentha aquatica*, *L.* Europe, watery places. ㄥ  
*A. Mentha viridis*, *L.* Ditto, ditto. (Spear-mint.) ㄥ  
*A. Stachys arvensis*, *L.* Ditto, waste places. ☉  
*A. Marrubium vulgare*, *L.* Ditto, ditto. (Horehound.) ㄥ  
*A. Prunella vulgaris*, *L.* Ditto, ditto. ㄥ

## PHYTOLACCEÆ.

- A. Phytolacca decandra*, *L.* N. America. (Virginian Poke-weed.) ㄥ

## PLANTAGINEÆ.

- Plantago major*, *L.* Europe, fields, etc. (Plantain.) ㄥ  
*Plantago lanceolata*, *L.* Ditto, ditto. ㄥ

## POLYGONEÆ.

- Polygonum aviculare*, *L.* (p. 235). Europe, waste places. (Cow Grass of Colonists.) ☉  
*Polygonum minus*, *Huds.* Ditto, ditto. ☉  
*Rumex obtusifolius*, *L.* Ditto, ditto. (Dock.) ㄥ

- A. *Rumex conglomeratus*, *Murr.* Ditto, watery places. ㄥ  
*Rumex crispus*, *L.* Ditto, roadsides, etc. ㄥ  
*Rumex Acetosa*, *L.* Ditto, meadows. (Sorrel.) ㄥ  
*Rumex Acetosella*, *L.* Gravelly places. ㄥ

## CHENOPODIACEÆ.

- A. *Chenopodium album*, *L.* Europe, waste places. (Goosefoot.) ⊙  
A. *Chenopodium viride*, *L.* ⊙  
*Chenopodium urbicum*, *L.* (p. 231). Ditto, ditto. ⊙  
*Chenopodium ambrosioides*, *L.* (p. 231). Ditto, ditto. ⊙

## AMARANTHACEÆ.

- Euxolus viridis*, *Mog.* Tropics, weed of cultivation. ⊙

## EUPHORBIACEÆ.

- A. *Euphorbia Peplus*, *L.* Europe, waste places. (Spurge.) ⊙  
*Euphorbia Helioscopia*, *L.* Ditto, ditto. ⊙  
*Jatropha Curcas*, *L.* America, waste places. (Physic-nut.) ㄥ  
*Ricinus Palma-Christi*, *L.* Ditto, ditto. (Castor Oil.) ㄥ  
*Poranthera ericifolia*, *Rudge.* Australia. ㄥ

## URTICEÆ.

- Urtica urens*, *L.* Europe, waste places. (Common Nettle.) ㄥ

## CLASS II. MONOCOTYLEDONES.

## DIOSCOREÆ.

- Dioscorea alata*, *L.* India. Occasionally cultivated during late years by the natives. (Yam.) ㄥ

## AROIDEÆ.

- Colocasia antiquorum*, *Schott.* (esculenta, *Schott.*) Asia. Two principal varieties are cultivated by the aborigines, a small (Taro), and a large, introduced by Europeans (Taro-hoia). ㄥ  
*Alocasia Indica*, *Schott.* India, recently introduced and cultivated by the natives. (Edoes.) ㄥ

## CYPERACEÆ.

- Cyperus tenellus*, *L.* (p. 745). South Africa. ⊙

## GRAMINEÆ.

- A. *Phleum pratense*, *L.* (p. 321). Europe, meadows. (Timothy Grass.) ㄥ  
*Alopecurus agrestis*, *L.* (p. 321). Ditto, fields. (Foxtail Grass.) ⊙  
*Phalaris canariensis* (p. 321). Ditto, waste places. (Canary Grass.) ⊙

- Holcus mollis*, *L.* (p. 333). Ditto, pastures, etc. ♀  
*Holcus lanatus*, *L.* Ditto, ditto. ♀  
*Anthoxanthum odoratum*, *L.* (p. 321). Ditto, meadows. (Sweet Vernal Grass.) ♀  
*Panicum colonum*, *L.* (p. 324). S. Europe, waste places. ☉  
*Panicum glaucum*, *L.* (p. 324). Europe, waste places. ☉  
*Panicum sanguinale*, *L.* (p. 324). Ditto, ditto. ☉  
*Cynodon Dactylon*, *L.* (p. 331). Ditto, ditto. (Doab Grass.) ♀  
*Agrostis vulgaris*, *With.* Ditto, meadows. (Bent Grass.) ♀  
*Avena sativa*, *L.* (p. 336). Ditto, cultivated places. (Oats.) ☉  
*Eleusine indica*, *Gærtn.* (p. 331). India, cultivated places. ☉  
A. *Poa trivialis*, *L.* Europe, meadows, etc. ♀  
*Poa annua*, *L.* (p. 340). Ditto, waysides, etc. ☉  
*Briza minor*, *L.* Ditto, meadows. ☉  
*Briza maxima*, *L.* Ditto, ditto. (Quaking Grass.) ☉  
*Cynosurus cristatus*, *L.* Ditto, dry pastures. ♀  
A. *Dactylis glomerata*, *L.* Ditto, waysides, etc. (Cock's-foot Grass.) ♀  
*Festuca bromoides*, *L.* (p. 341). Ditto, ditto. ☉  
A. *Bromus sterilis*, *L.* Ditto, ditto. ☉  
A. *Bromus erectus*, *Huds.* Ditto, fields, etc. ♀  
A. *Bromus commutatus*, *Schrad.* Ditto, ditto. ☉ or ♂  
*Bromus mollis*, *L.* (p. 341). Ditto, meadows. ☉ or ♂  
*Bromus racemosus*, *L.* (341). Ditto, ditto. ☉ or ♂  
*Lolium temulentum*, *L.* Ditto, cornfields, etc. (Rye Grass.) ☉  
*Lolium perenne*, *L.* Ditto, ditto. ♀ or ♂  
*Triticum sativum*, *L.* ☉  
*Hordeum sativum*, *L.* (p. 343). Ditto. (Barley.) ☉  
A. *Lepturus incurvatus*, *Trin.* Seashores. (Sands, Waitemata, *Kirk.*) ☉  
*Anthistiria australis*, *Br.* (p. 325.) ♀

It is possible that some of the above, which are annual ☉ in Europe, may become perennial ♀ in New Zealand, owing to the mildness of the winters.

## ALPHABETICAL LIST OF NATIVE AND VERNACULAR NAMES.

The native names here enumerated are, with few exceptions, supplied by my friend Mr. Colenso, whose intimate knowledge of the botany and language of New Zealand guarantees their accuracy. For a few chiefly in use by natives of the Otago district I am indebted to Dr. Hector, and for still others to a MS. obligingly lent me by Dr. Lauder Lindsay. And, lastly, whilst this sheet was in the printer's hands, I have received the valuable Maori-Latin Index to the Handbook of this Flora, edited by Dr. Hector, and printed under the authority of the New Zealand Government at Wellington (1866).

- Aka, *Col.* *Metrosideros scandens*.  
 Akakura. *Metrosideros scandens*.  
 Ake, *Col.* *Dodonaea viscosa*.  
 Ake-ake, *Hector.* *Olearia avicenniaefolia*.  
 Ake-piro, *Col.* *Olearia furfuracea*.  
 Akeraurangi, *Mantell.* *Dodonaea viscosa*.  
 Akewharangi, *Geolog. Surv.* *Olearia Cunninghamii*.  
 Arbor vitæ. *Libocedrus Doniana*.  
 Aruhe, *Col.* *Pteris aquilina*.  
 Aster, native. *Celmisia*, various sp.  
 Aute, *Col.* *Broussonetia papyrifera*.  
 Auta-taranga, *Col.* *Pimelea arenaria*.  
 Avens. *Geum urbanum*, var. *strictum*.  
 Beech, native. *Fagus*.  
 Birch of New Zealand. *Fagus*.  
 Black pine of Otago, *Hector.* *Podocarpus spicata* and *ferruginea*.  
 Bluebell, native. *Wahlenbergia*, several sp.  
 Braeken. *Pteris aquilina*.  
 Broad leaf, *Hector.* *Griselinia lucida*.  
 Bocarro, or } *Hector.* *Elæocarpus Hook-*  
 Bokako, } *erianus*.  
 Bramble. *Rubus australis*.  
 Broom, native. *Carmichaelia*, various sp.  
 Broom, pink. *Notospartium Carmichaeliæ*.  
 Bulrush. *Typha angustifolia*.  
 Burr. *Acæna*.  
 Bur-reed. *Sarganium simplex*.  
 Buttercup. *Ranunculus*, various sp.  
 Celery, native. *Apium australe*.  
 Cohou-cohou, *Raoul.* *Pittosporum obcordatum*.  
 Cowage. *Bidens pilosa*.  
 Cotton plant of Otago. *Astelia*, various sp.  
 Cranesbill. *Geranium*.  
 Cutting grass. *Gahnia*, various sp.  
 Cypress. *Libocedrus Doniana*.  
 Daisy, native. *Lagenophora*, various sp.  
 Daisy-trees. *Olearia*, various sp.  
 Dandelion. *Taraxacum Dens-leonis*.  
 Dock. *Rumex flexuosus*.  
 Dodder. *Cuscuta densiflora*.  
 Duckweed. *Lemna*.  
 Eketera, *D'Urville.* *Lepidium oleraceum*.  
 Everlasting. *Gnaphalium*, various sp.  
 Flax, native. *Linum monogynum*.  
 Flax, New Zealand. *Phormium tenax*.  
 Groundsel. *Senecio*, various sp.  
 Haekaro. *Pittosporum umbellatum*.  
 Hakeke, *Col.* *Polyporus* sp.  
 Hange-hange, *Col.* *Geniostoma ligustri-folium*.  
 Harakeke, *Col.* *Phormium tenax* and *Colensoi*.  
 Harori, *Col.* *Agaricus adiposus*.  
 Hauama, *Col.* *Eutelea arborescens*.  
 Hawhato, *Col.* *Cordiceps Robertsii*.  
 Hawthorn, native. *Discaria Toumatou*.  
 Heru-heru, *Col.* *Leptopteris hymenophylloides*.  
 Heath, native of Otago. *Leucopogon Frazeri*.



- Hinahina, *Geolog. Surv.* *Melicytus ramiflorus*.  
 Hinatoli, *Geolog. Surv.* *Epilobium*.  
 Hinaan, *Cunn.* *Elæocarpus dentatus*.  
 Hinau, *Raoul.* *Elæocarpus Hookerianus*.  
 Hiri turiti, *Hector.* Epiphytic Orchids, various.  
 Hohere, *Cunn.* *Hoheria populnea* and *Plagianthus Lyallii*.  
 Hoboeka, Middle Island, *Lyall.* *Panax crassifolia*.  
 Horahora, *Geolog. Surv.* *Astelia*.  
 Horoeaka, *Col.* *Panax crassifolia*.  
 Horoweeka, *Hector.* *Panax*, various sp.  
 Horopito, *Col.* *Drimys axillaris*.  
 Houka, *Geolog. Surv.* *Cordyline australis*.  
 Houma, *Hector.* *Sophora tetraptera*.  
 Horu-horu, *Lindsay.* *Brassica Rapa*.  
 Houhere, *Col.* *Hoheria populnea*.  
 Houi, *Col.* *Hoheria populnea*.  
 Hue, *Col.* *Cucurbita* sp.  
 Hunangamoho, *Col.* *Apera arundinacea*.  
 Hune, *Col.* Pappus of seeds of *Typha angustifolia*.  
 Hutiwai, Middle Island, *Lyall.* *Acæna Sanguisorba*.  
 Hutu, *Geolog. Surv.* *Ascarina lucida*.  
 Ice-plant, native. *Tetragonia expansa* and *Mesembryanthemum australe*.  
 Ini-ini, *Hector.* *Melicytus ramiflorus*.  
 Iron-wood, *Hector.* *Metrosideros lucida*.  
 Ivy-tree. *Panax Colensoi*.  
 Kaha-kaha, *Col.* *Astelia Solandri*.  
 Kahikatea, *Col.* *Podocarpus dactyloides*.  
 Kahikatoa, *Col.* *Leptospermum scoparium*.  
 Kahikomako, *Col.* *Pennantia corymbosa*.  
 Kaho, *Cunn.* *Linum monogynum*.  
 Kaikaiaua, *Rhabdotheramnus Solandri*.  
 Kaikatea, *Col.* *Podocarpus dactyloides*.  
 Kaikomako, *Col.* *Pennantia corymbosa*.  
 Kai-ku, *Col.* *Parsonsia heterophylla*.  
 Kaiwhiria, *Col.* *Hedycarya dentata*.  
 Kaiwiria, *Geolog. Surv.* *Panax simplex*.  
 Kakaha, *Hector.* *Astelia nervosa*.  
 Kakaho, *Col.* *Arundo conspicua*.  
 Kakaramu, *Geolog. Surv.* *Coprosma lucida*.  
 Kaika, *Geolog. Surv.* *Senecio glastifolius*.  
 Kalamon, *Hector.* *Coprosma lucida*.  
 Kaneree, *Col.* *Vitex littoralis*.  
 Kapia, *Geolog. Surv.* Gum dug up of *Dammara australis*.  
 Kapook, *Hector.* *Griselinia lucida*.  
 Karaka, *Col.* *Corynocarpus laevigata*.  
 Karamu, *Col.* *Coprosma foetidissima*.  
 Karamu, *Col.* *Coprosma lucida* and *robusta*.  
 Karangu, *Col.* *Coprosma lucida*.  
 Kareao, *Col.* *Rhipogonum parviflorum*.  
 Karengo, *Col.* *Laminaria* sp.  
 Karetu, *Col.* *Hierochloa redolens*.  
 Karito, *Lindsay.* *Typha angustifolia*.  
 Karmahi, *Hector.* *Weinmannia silvicola* and *racemosa*.  
 Karo, *Col.* *Pittosporum cornifolium* and *crassifolium*.  
 Karo, Middle Island, *Lyall.* *Pittosporum tenuifolium*.  
 Katute, *Hector.* *Dicksonia antarctica*.  
 Kaudi, *Dammara australis*.  
 Kauere, *Vitex littoralis*.  
 Kauri, *Col.* *Dammara australis*.  
 Kawaka, *Col.* *Libocedrus Donianus*.  
 Kawa-kawa, *Col.* *Piper excelsum*.  
 Kiekie, *Col.* *Freycinetia Banksii*.  
 Kihii, *Geolog. Surv.* *Pittosporum crassifolium*.  
 Kohe-kohe, *Col.* *Dysorxylum spectabile*.  
 Koheriki, *Col.* *Angelica rosafolia*.  
 Kohi, *Hector.* *Schefflera digitata*.  
 Kohia, *Col.* *Passiflora letrandra*.  
 Kohoho, *Col.* *Solanum aviculare*.  
 Kohoukohou, *Geolog. Surv.* *Pittosporum obcordatum*.  
 Kohuhu, *Col.* *Pittosporum tenuifolium*.  
 Kohu-kohu, *Geolog. Surv.* *Pittosporum obcordatum*.  
 Kohu-kohu, *R. Cunn.* *Scleranthus biflorus*.  
 Kohn-kohu, *Lindsay.* *Stellaria media*.  
 Kohutuhutu, *Col.* *Fuchsia excorticata*.  
 Kokaho, *Arundo conspicua*.  
 Koke, *Passiflora tetrandra*.  
 Kokihi, *Col.* *Tetragonia trigyna*.  
 Kokomuka, *Veronica* sp.  
 Konine, *Fuchsia excorticata*.  
 Kopa-kopa, *Lindsay.* *Plantago* sp.  
 Kopata, *Lyall.* *Pelargonium clandestinum*.  
 Kopata, *Col.* *Geum urbanum* var. *strictum*.  
 Koporokaiwhiri, *Hedycarya dentata*.  
 Kopoupou, *D'Urville.* *Scirpus lacustris*.  
 Kopupungawha, *Lindsay.* *Typha angustifolia*.  
 Kopura, *Col.* *Hepatica*, various.  
 Korari, *Col.* *Phormium tenax* and *Colensoi*.  
 Korau, *Lindsay.* *Brassica Rapa*.  
 Korau, *Col.* *Cyathia medullaris*.  
 Koreirei, *Col.* Roots of *Typha angustifolia*.  
 Korikori, *Lindsay.* *Ranunculus*, various sp.  
 Koro, *Col.* Fruit of *Podocarpus dactyloides*.  
 Korokio, *Lindsay.* *Veronica* sp.  
 Korokio-taranga, *Col.* *Korokia buddleioides*.  
 Koromeek, *Hector.* *Panax simplex*.  
 Koro-miko, *Bidwill.* *Veronica parviflora*.  
 Koromiko, *Geolog. Surv.* *Veronica elliptica*.  
 Korumeek, *Hector.* *Veronica salicifolia*.  
 Koromiko-taranga, *Col.* *Veronica*.

- Koromuti, *Hector*. *Panax simplex*.  
 Koropuku, *Col*. *Gaultheria æpressa*.  
 Kotohituk, *Hector*. *Fuchsia excorticata*.  
 Kotukutuku, *Col*. *Fuchsia excorticata*.  
 Kouka, *Lindsay*. *Cordylina australis*.  
 Koware, *Lindsay*. *Typha angustifolia*.  
 Kowhai, *Col*. *Sophora tetraptera*, var. *grandiflora*.  
 Kowhaingutu-kaka, *Cunn*. *Clianthus puniceus*.  
 Kowhara-whara, *Col*. *Astelia Cunninghamhamii* and *Banksii*.  
 Kowhiti-whiti, *Lindsay*. *Nasturtium officinale*.  
 Kumara, *Col*. *Iponoea Batatas*.  
 Kumarahou, *Col*. *Pomaderris elliptica*.  
 Ku-papa, *R. Cunn*. *Passiflora tetrandra*.  
 Kuri-kuri, Middle Island, *Lyall*. *Aciphylla squarrosa*.  
 Kuriwao, *Hector*. *Rhipogonum scandens*.  
 Lawyer, *Rubus australis*, *Parsonsia*, etc.  
 Leather plant, *Celmisia*, various sp.  
 Luma-luma, *Hector*. *Coprosma foetidissima*.  
 Maanawa, *Col*. *Avicennia tomentosa*.  
 Maha-maka, *A. Cunn*. *Ackama rosafolia*.  
 Mahimahi, *Col*. *Elæocarpus Hookerianus*.  
 Mahoe, *Col*. *Melicope ramiflorus*.  
 Mahuri, *Raoul*. *Alternanthera sessilis*.  
 Mai, *Cunn*. *Podocarpus spicata*.  
 Maikaika, *Col*. *Arthropodium cirrhatum*.  
 Maikaika, *Lyall*. *Thelymitra pulchella*.  
 Maikaika, *Col*. *Orthoceras Solandri*.  
 Maikaika, *Geolog. Surv.* *Metrosideros robusta*.  
 Maire, *Col*. *Olea* sp. (in the south of N. Isl.).  
 Maire, *Col*. *Santalum Cunninghamhamii* (in the north of N. Island).  
 Mairehan, *Col*. *Phebalium nudum*.  
 Maire raunui, *Col*. *Olea Cunninghamhamii*.  
 Maire-tawhake, *Col*. *Eugenia Maire*.  
 Makaika, *Col*. *Orthoceras Solandri*.  
 Makaka, *Geolog. Surv.* *Carmichaelia australis*.  
 Makamaka, *Col*. *Ackama rosafolia*.  
 Makomako, *Col*. *Aristotelia racemosa*.  
 Mamaku, *Col*. *Cyathea medullaris*.  
 Mamangi, *Geolog. Surv.* *Coprosma spatulata*.  
 Mamuk, *Hector*. *Cyathea medullaris*.  
 Manawa, *Cunn*. *Avicennia tomentosa*.  
 Manawau, *Geolog. Surv.* *Dacrydium Colensoi*.  
 Maugeao, *Col*. *Tetranthera calicaris*.  
 Mange-mange, *Col*. *Lygodium articulatum*.  
 Mangrove, *Avicennia officinalis*.  
 Manoaio, *Col*. *Dacrydium Colensoi*.  
 Manouea, Middle Island, *D'Urville*. *Leptospermum ericoides*.  
 Manuka, *Col*. *Leptospermum scoparium*.  
 Manuka-rau-riki, *Col*. *Leptospermum ericoides*.  
 Maori Parsnip, *Hector*. *Ligusticum Lyallii*.  
 Mapara, *Col*. Hardwood of *Dacrydium cupressinum*.  
 Mapau, *Col*. *Myrsine australis*.  
 Mapauriki, *Cunn*. *Pittosporum tenuifolium*.  
 Maru, *Col*. *Sparganium simplex*.  
 Mataii, *Col*. *Podocarpus spicata*.  
 Mataugoa, *Huegel*. *Cardamine stylosa*.  
 Matata, *Geolog. Surv.* *Rhabdotheramnium Solandri*.  
 Matipo, Middle Island, *Lyall*. *Myrsine Urvilleana*.  
 Matuakunara, *Col*. *Geranium dissectum*.  
 Maukoro, *Lindsay*. *Carmichaelia australis*.  
 Mawhai, *Col*. *Sicyos angulatus*.  
 Meeka-meek, *Hector*. *Hymenophyllum* sp.  
 Miko, *Areca sapida*.  
 Mingi, *Lindsay*. *Coprosma myrtillofolia*.  
 Mingi, *Lindsay*. *Cyathodes acerosa*.  
 Mingimingi, *Col*. *Leucopogon fasciculatus*.  
 Mint, *Mentha*.  
 Miro, *Col*. *Podocarpus ferruginus*.  
 Mistletoe, *Loranthaceæ*, various.  
 Moka, *Hector*. *Aristotelia racemosa*.  
 Moko-piko, *Bidwill*. *Libocedrus Donianus*.  
 More, *Lindsay*. *Dammara australis*.  
 Muka, *W. Mantell*. Dressed fibre of *Phormium tenax*.  
 Muka-muk, *Hector*. *Hymenophyllum* sp.  
 Naéréoré, Middle Island, *D'Urville*. *Scleranthus biflorus*.  
 Nahinahi, *Lindsay*. *Convolvulus soldanella*.  
 Nani, *Lindsay*. *Brassica campestris*.  
 Nao, *D'Urville*. *Linum monogynum*.  
 Neinei, *Col*. *Dracophyllum latifolium*.  
 Neinei, *Lyall*. *Carmichaelia australis*.  
 Nettle, *Urtica*, various sp.  
 Ngaio, *Col*. *Myoporum laetum*.  
 Ngawha, *Lindsay*. *Typha angustifolia*.  
 Nightshade, *Solanum nigrum*.  
 Nikau, *Col*. *Areca sapida*.  
 Noté-noho, *D'Urville*. *Arenaria media*.  
 Oho, *Hector*. *Panax Lessonii*.  
 Oehiakura, *Lindsay*. *Dicksonia squarrosa*.  
 Ohoeka, *Lindsay*. *Panax crassifolia*.  
 Oioi, *Col*. *Leptocarpus simplex*.  
 Onga-onga, *Col*. *Urtica ferox*, and others.  
 Orange-leaf of Otago. *Coprosma lucida*, etc.  
 Orewa, *Geolog. Surv.* *Sapota costata*.  
 Oru, *Cunn*. *Colensoa physaloides*.  
 Pahautea, *Col*. *Libocedrus Bidwillii*.  
 Pakue, *Hector*. *Dicksonia squarrosa*.  
 Pauake, *Col*. *Convolvulus sepium*.  
 Palm, *Nelson*. *Areca sapida*.

- Panahi, Col. *Convolvulus sepium*.  
 Panapana, Col. *Cardamine hirsuta*.  
 Papauma, Col. *Coprosma grandifolia*.  
 Papaii, Col. *Aciphylla squarrosa*.  
 Para, Col. *Marattia sahcina*.  
 Para-para, Col. *Pisonia Sinclairii*.  
 Parataniwha, Col. *Elatostemma rugosum*.  
 Parerarera, Lindsay. *Plantago* sp.  
 Paretao, Col. *Asplenium obtusatum*.  
 Paruwhatitiri, Col. *Ileodictyon cibarium*.  
 Patate, Middle Island, Lyall. *Schefflera digitata*.  
 Patete, Geolog. Surv. *Melicope ternata*.  
 Pate, Col. *Schefflera digitata*.  
 Patotara, Col. *Botrychium Virginicum*.  
 Patotara, Col. *Leucopogon Fruseri*.  
 Pa-totara, Middle Island, Lyall. *Cyathodes Oxycedrus*.  
 Peka-pekī, Middle Island, Lyall. *Erechtites quadridentata*.  
 Pekepekekiore, Col. *Hydnum clathroides*.  
 Pellitory. *Parietaria debilis*.  
 Pepper-tree. *Drimys axillaris*.  
 Pepper, native. *Piper excelsum*.  
 Pére, Col. *Alseuosmia Bunksi*.  
 Perei, Col. *Gastrodia Cunninghamii*.  
 Piamanuka, Col. Manna exudation of *Leptospermum scoparium*.  
 Pikiarero, Col. *Clematis hexasepala*.  
 Pinakitere, Lindsay. *Geranium dissectum*.  
 Pine, red. *Dacrydium cupressinum*.  
 Pine, black. *Podocarpus ferruginea*.  
 Pingae or } *Desmoschænus spiralis*.  
 Pingao, }  
 Piri-kahu, Col. *Acæna Sanguisorbæ*.  
 Piri-piri, Col. *Acæna Sanguisorbæ*.  
 Piri-piri, Col. *Bolbophyllum pygmaeum*.  
 Piri-piri, Cunn. *Haloragis tenella*.  
 Piri-piri, Lindsay. *Pittosporum cornifolium*.  
 Piri-piri Whata, Cunn. *Carpodetus serratus*.  
 Pirita, Col. *Rhipogonum parviflorum*.  
 Piri-ta, Col. *Tupeia antarctica*.  
 Pitau, Lindsay. *Cyathea medullaris*.  
 Piu-Piu, Col. *Polypodium pennigerum*.  
 Plantain. *Plantago*, various sp.  
 Pohue, Col. *Convolvulus sepium*.  
 Pohuehue, Lindsay. *Polygonum complexum*.  
 Pohuihui, Geolog. Surv. *Passiflora tetrandra*.  
 Pohutukawa, Col. *Asplenium flaccidum*.  
 Pohutukawa, Col. *Metrosideros tomentosa*.  
 Pokaka, Col. *Elæocarpus dentatus* and *Hookerianus*.  
 Poko-poko-nui-ha-ura. *Clematis parviflora*.  
 Ponga, of Chatham Island. *Cyathea Cunninghamii*.  
 Ponga, Col. *Cyathea dealbata*.  
 Pondweed. *Potamogeton*.  
 Popero, Lindsay. *Solanum aviculare*.  
 Popoiahaakeke, Col. *Polyporus* sp.  
 Popi-hui, Hector. *Libertia micrantha*.  
 Popohū, Hector. *Arthropodium cirrhatum*.  
 Porokaiwhiri, Col. *Hedycarya dentata*.  
 Poroporo, Col. *Solanum aviculare* and *nigrum*.  
 Poroua, Col. *Sonchus oleraceus*.  
 Poukatea, Raoul. *Griselinia littoralis*.  
 Puawhananga, Lindsay. *Clematis indivisa*.  
 Puheritaiko, Lyall. *Senecio rotundifolius*.  
 Puhou, Southern Island, Lyall. *Coriaria ruscifolia*.  
 Puka, Col. *Polygonum australe* and *Meryta Sinclairii*.  
 Pukapuka, Col. *Brachyglottis repanda*.  
 Pukariao, Geolog. Surv. *Brachyglottis repanda*.  
 Pukatea, Col. *Atherosperma novæ-Zelandiæ* and *Griselinia lucida*.  
 Pukurau, Col. *Lycoperdon Fontainesii*.  
 Pungapunga, Geolog. Surv. Pollen of *Typha angustifolia*.  
 Punui, Col. *Cyathea Cunninghamii*.  
 Puri-puri-ki-pili, Hector. *Hedycarya dentata*.  
 Puriri, Col. *Vitex littoralis*.  
 Putawa, Col. *Bolotus*.  
 Puwha, Col. *Sonchus oleraceus*.  
 Puwhananga, Col. *Clematis indivisa*.  
 Rahu-rahu, Lindsay. *Pteris aquilina*.  
 Raka-pika, R. Cunn. *Metrosideros florida*.  
 Ramarama, Col. *Myrtus bullata*.  
 Raugiora, Col. *Brachyglottis repanda*.  
 Rata, Col. *Metrosideros robusta*.  
 Rata, Middle Island, Lyall. *Metrosideros florida*.  
 Ratapiki, R. Cunn. *Metrosideros florida*.  
 Rauhuia, Col. *Linum monogynum*.  
 Raukawa, Col. *Panax Edgerleyi*.  
 Raupeti, Col. *Solanum nigrum*.  
 Raupo, Col. *Typha angustifolia*.  
 Rau-Raua, Edgerley. *Panax Edgerleyi*.  
 Rautahi, Col. *Carex ternaria*.  
 Rawiri, Northern Island, Cunn. *Leptospermum ericoides*.  
 Red Pine. *Dacrydium cupressinum*.  
 Reedmace. *Typha angustifolia*.  
 Rengarenga, Col. *Arthropodium cirrhatum*.  
 Rewarawa, Geolog. Surv. *Dysoxylum spectabile*.  
 Rewarewa, Col. *Knightia excelsa*.  
 Ribbon-wood of Otago. *Hoheria populnea*.  
 Rimu, Bidwill. *Dacrydium laxifolium*.  
 Rimu, Col. *Dacrydium cupressinum*.  
 Rimurapa, Col. *D'Urvillea utilis*.  
 Ririwaka, Col. *Scirpus muritimus*.  
 Rohutu, Col. *Myrtus pedunculata*.



- Roi, Col. *Pteris aquilina* (root of).  
 Roniu, Col. *Brachycome odorata*.  
 Roniu, Col. *Brachycome radicata*.  
 Rue, black. *Podocarpus spicata*.  
 Rush. *Juncus*.  
 Runa, Lindsay. *Rumex* sp.  
 Sarsaparilla, native. *Rhipogonum scandens*.  
 Spinach, New Zealand. *Tetragonia expansa*.  
 Sorrelwood. *Oxalis mugellanica*.  
 Sow-thistle. *Sonchus oleraceus*.  
 Spear-grass. *Aciphylla squarrosa*.  
 Sterile wood of Otago. *Coprosma foetidissima*.  
 Sundew. *Drosera*.  
 Supple-jack. *Rubus australis*, *Parsonsia*, *Lygodium*, etc.  
 Tamingi, Geolog. Surv. *Epacris pauciflora*.  
 Tauekaha, Col. *Phyllocladus trichomanoides*.  
 Tangeao, Col. *Tetranthera calicaris*.  
 Taraire, Col. *Nesodaphne Taraire*.  
 Taramea, Col. *Aciphylla Colensoi*.  
 Tarata, Col. *Pittosporum eugenoides*.  
 Tarata, R. Cunn. *Pittosporum crassifolium*.  
 Tarata, Lindsay. *Pittosporum tenuifolium*.  
 Taro, Col. *Caladium esculentum*.  
 Tataka, Mantell. *Melicope ternata*.  
 Tatara-hake, Col. *Coprosma acerosa*.  
 Tataramoa, Col. *Rubus australis*.  
 Tauhinu, Col. *Pomaderris ericifolia*.  
 Tauhinu, Geolog. Surv. *Podocarpus nivalis*.  
 Taupata, Col. *Coprosma retusa*.  
 Tawa, Col. *Nesodaphne Tawa*.  
 Tawaapou, Col. *Sapota costata*.  
 Tawai, Col. *Fagus Menziesii*.  
 Tawai, Bidwill. *Fagus fusca*.  
 Tawai, Cunn. *Weinmannia racemosa*.  
 Tawairauriki, Geolog. Surv. *Fagus Solandri*.  
 Tawaiwai, Lindsay. *Phyllocladus trichomanoides*.  
 Tawari, Col. *Ixerba brexioides*.  
 Taweki, Lindsay. *Coriaria ruscifolia*.  
 Tawhai, Col. *Fagus Menziesii* and *Solandri*.  
 Tawhai-rau-nui, Col. *Fagus fusca*.  
 Tawhara, Col. *Freycinetia Banksii*.  
 Tawhero, Col. *Weinmannia sylvicola*.  
 Tawhero (Southern Island), Lyall. *Weinmannia racemosa*.  
 Tawhiwhi, Col. *Pittosporum tenuifolium*.  
 Tawiri Karo, Lindsay. *Pittosporum cornifolium*.  
 Tea-tree of settlers. *Leptospermum scoparium*.  
 Tepuaotereinga, Taylor. *Dactylanthus Taylorii*.  
 Thorn, native. *Discaria Toumatou*.  
 Thyme, wild, of Otago. *Samolus littoralis*.  
 Ti, Col. *Cordyline australis* and *indivisa*.  
 Tikapu, Col. *Cordyline indivisa*.  
 Tikoraha, Col. *Cordyline stricta*.  
 Tikupenga, Lindsay. *Cordyline stricta*.  
 Tikumu, Col. *Celmisia coriacea*.  
 Tikoraka, Geolog. Surv. *Cordyline pumilio*.  
 Tingahere, Geolog. Surv. *Cordyline stricta*.  
 Tiparae, Geolog. Surv. *Cordyline Banksii*.  
 Tipau, Col. *Myrsine Urvillei* and *salicina*.  
 Tiraauriki, Geolog. Surv. *Cordyline pumilio*.  
 Titawhiti, Geolog. Surv. *Cordyline* sp.  
 Titi-rangi (Middle Island), Lyall. *Veronica spectosa*.  
 Titoki, Col. *Alectryon excelsum*.  
 Titongi, Col. *Alectryon excelsum*.  
 Toa-toa, Col. *Phyllocladus trichomanoides*.  
 Toa-toa, D'Urville. *Haloragis alata*.  
 Toe-toe. *Arundo conspicua*.  
 Toe-toe, Col. *Cyperus ustulatus*.  
 Toe-toe-whatu-mauu, Lyall. *Cyperus ustulatus*.  
 Toi, Col. *Barbarea vulgaris*.  
 Topitopi, Mantell. *Alectryon excelsum*.  
 Toro, Col. *Persoonia Toro*.  
 Toromiro. *Podocarpus ferruginea*.  
 Torotoro, Lindsay. *Metrosideros scandens*.  
 Totara, Lindsay. *Cyathodes oxycedrus*.  
 Totara, Col. *Leucopogon Frazeri*.  
 Totara, Col. *Podocarpus totara*.  
 Totarakirikotukutuku, Mantell. *Libocedrus Doniana*.  
 Totera, Cunn. *Fuchsia procumbens*.  
 Toumatou, Raoul. *Discaria australis*.  
 Towai, Col. *Weinmannia racemosa*.  
 Towai, Hector. *Cordyline indivisa*.  
 Towai, Raoul. *Epicaurpus microphyllus*.  
 Traveller's-joy. *Clematis*.  
 Tree-fern, grey. *Cyathea medullaris*.  
 Tree-fern, silver. *Cyathea dealbata*.  
 Tuakura, Lindsay. *Dicksonia squarrosa*.  
 Tukirunga, Col. *Dicksonia antarctica*.  
 Tukarehu, Lindsay. *Plantago* sp.  
 Tumatakuru, Col. *Discaria Toumatou*.  
 Tumingi, Middle Island, Lyall. *Leucopogon fasciculatus*.  
 Tupak Grass of Otago. *Carex appressa*.  
 Tupa-kihi, Col. *Coriaria ruscifolia*.  
 Tupari, Hector. *Olearia operina* and *O. Lyallii*.  
 Turawera, Col. *Pteris tremula*.  
 Turutu, Lindsay. *Dianella intermedia*.  
 Turutu, Lyall. *Libertia irioides*.  
 Tute, a wild, Hector. *Olearia operina*.  
 Tatu, Col. *Coriaria ruscifolia*.  
 Tutuheuheu, Mantell. *Coriaria thymifolia*.  
 Tutu-nawai, Col. *Polygonum prostratum*.  
 Tutupapa, Col. *Coriaria thymifolia*.  
 Upoko-tangata, Col. *Cyperus ustulatus*.  
 Ureure, Col. Fruit of *Freycinetia Banksii*.



- Vegetable-sheep. *Raoulia eximia* and others.
- Waekahu, *Lindsay. Lycopodium volubile.*
- Wae-wae-kaka, *Col. Gleichenia semi-vestita.*
- Wae-wae-koukou, *Col. Lycopodium volubile.*
- Wae-wae-matuku, *Col. Gleichenia semi-vestita.*
- Warikauri, *Geolog. Surv. Kauri gum.*
- Wawa paka, *Hector. Panax arboreum.*
- Wawapaku, *Col. Panax anomala.*
- Wainatua, *Col. Euphorbia glauca.*
- Wainatua, *Lindsay. Rhabdothamnus Solandri.*
- Wakaka, *Lyall. Carmichaelia australis.*
- Water-lily, New Zealand. *Ranunculus Lyallii.*
- Wawa-paku, *Col. Panax anomala.*
- Waupaku, *Lindsay. Panax arborea.*
- Weki, *Col. Dicksonia squarrosa.*
- Wekiponga, *Col. Dicksonia antarctica.*
- Whakapiopio, *Lindsay. Metrosideros scandens.*
- Whakatangitangi, *Lindsay. Metrosideros sp.*
- Whanako. *Cordyline australis.*
- Wharaeki. *Phormium Colensoi.*
- Wharangi, *Col. Melicope ternata.*
- Wharangi-piro, Middle Island, *Lyall. Olearia Cunninghamii.*
- Wharangi-pirou, *Col. Melicope ternata.*
- Whawhako, *Geolog. Surv. Eugenia Maire.*
- Wha-whi, Chatham Island. *Plagianthus betulinus.*
- Whau, *Col. Entelea arborescens.*
- Whau-whan, *R. Cunn. Panax Lessoni.*
- Whau-whau, *Lindsay. Plagianthus Lyallii.*
- Whau-whau-paku, *Col. Panax arborea.*
- Whau-whi, *Col. Hoheria populnea.*
- Whau-whi, *Lyall. Plagianthus Lyallii.*
- Whau-whi, *Geolog. Surv. Plagianthus betulinus.*
- Wheki, *Lindsay. Dicksonia squarrosa.*
- Whinau, *Lindsay. Elaeocarpus Hinau.*
- Whi, *Col. Juncus maritimus.*
- Whitau, *Mantell. Same as Muka (dressed flax).*
- Wild Irishman. *Discaria Toumatou.*
- Wild Spaniard. *Aciphylla.*
- Wiwi, *Col. Juncus maritimus and effusus.*
- Wiwi, *Lyall. Isolepis nodosa.*

# INDEX OF GENERA AND SPECIES.

*The synonyms are printed in italics.*

	Page		Page		Page
Abrotanella . . . . .	139	formosum . . . . .	360	Agrostis . . . . .	327
inconspicua . . . . .	140	<i>formosum</i> . . . . .	361	æmula . . . . .	329
pusilla . . . . .	139	fulvum . . . . .	361	antarctica . . . . .	327
rosulata . . . . .	139	hispidulum . . . . .	360	<i>Aucklandica</i> . . . . .	334
spatulata . . . . .	139	<i>pedatum</i> . . . . .	360	avenoides . . . . .	330
<i>Abrothallus orysoora</i> . . . . .	585	<i>pubescens</i> . . . . .	360	Billardieri . . . . .	329
Acæna . . . . .	55	<i>setulosum</i> . . . . .	360	canina . . . . .	328
adscendens . . . . .	56	<i>trapeziforme</i> . . . . .	360	<i>crinita</i> . . . . .	326
Buchanani . . . . .	57	trigonum . . . . .	360	<i>elatior</i> . . . . .	330
inermis . . . . .	57, 727	Æcidium . . . . .	625	<i>Forsteri</i> . . . . .	329
microphylla . . . . .	56	d isseminatum . . . . .	756	<i>gelida</i> . . . . .	328
Sanguisorbæ . . . . .	56	monocystis . . . . .	625	<i>leptostachys</i> . . . . .	329
<i>Acalyphum cylindricum</i> . . . . .	405	ranunculacearum . . . . .	625	<i>Lyallii</i> . . . . .	329
<i>Acaulon apiculatum</i> . . . . .	402	Æthallium . . . . .	620	<i>magellanica</i> . . . . .	328
Achnanthes . . . . .	720	septicum . . . . .	620	<i>montana</i> . . . . .	330
brevipes . . . . .	721	<i>Agalmanthus umbellatus</i> . . . . .	71	<i>multicaulis</i> . . . . .	328
<i>Achnatherum conspicuum</i> . . . . .	331	Agaricus . . . . .	600	<i>ovata</i> . . . . .	325
Acianthus . . . . .	264	adiposus . . . . .	602	parviflora . . . . .	328
<i>rivularis</i> . . . . .	266	appendiculatus . . . . .	604	<i>parviflora</i> . . . . .	328
Sinclairii . . . . .	264	arvensis . . . . .	603	<i>pilosa</i> . . . . .	329, 746
Aciphylla . . . . .	91	brevipes . . . . .	601	<i>procera</i> . . . . .	331
Colensoi . . . . .	92	campestris . . . . .	603	quadriseta . . . . .	330
Dobsoni . . . . .	93	campigenus . . . . .	603	<i>rigida</i> . . . . .	325
Lyallii . . . . .	92, 729	carneus . . . . .	602	<i>sciurea</i> . . . . .	326
Munroi . . . . .	93	cartilagineus . . . . .	601	setifolia . . . . .	329
squarrosa . . . . .	92	clypeolarius . . . . .	601	<i>subulata</i> . . . . .	328
Traversii . . . . .	729	cocciformis . . . . .	602	<i>vaginata</i> . . . . .	329
Ackama . . . . .	60	Colensoi . . . . .	602	Youngii . . . . .	330
rosæfolia . . . . .	60	erebius . . . . .	602	<i>Ahnfeldtia sedoides</i> . . . . .	713
Acrobolbus . . . . .	751, 753	euphyllus . . . . .	735	<i>Aira antarctica</i> . . . . .	335
<i>Acrophorus hispidus</i> . . . . .	358	exstructus . . . . .	601	<i>australis</i> . . . . .	334
Adelanthus . . . . .	518, 751	fascicularis . . . . .	603	<i>Kingii</i> . . . . .	334
falcatus . . . . .	518	infundibuliformis . . . . .	602	Ailographum . . . . .	630
Adenochilus . . . . .	265	novæ-Zelandiæ . . . . .	602	Bromi . . . . .	630
gracilis . . . . .	265	phalloides . . . . .	601	Alchemilla arvensis . . . . .	57
Adenocystis . . . . .	659	pyxidatus . . . . .	602	Alectoria . . . . .	564
Lessonii . . . . .	659	sapineus . . . . .	603	ochroleuca . . . . .	564
Adiantum . . . . .	359	semiglobatus . . . . .	603	Alectryon . . . . .	45
æthiopicum . . . . .	360	strophosus . . . . .	603	excelsum . . . . .	45
affine . . . . .	360	stuppeus . . . . .	604	Alepyrum . . . . .	295
<i>assimile</i> . . . . .	360	umbelliferus . . . . .	602	pallidum . . . . .	296
Cunninghamii . . . . .	300, 748	<i>Aglaophyllum D'Urvillei</i> . . . . .	686	Algæ . . . . .	638

	Page		Page		Page
<i>Allantodia australis</i>	374	decipiens	98, 730	racemosa	180
<i>tenera</i>	374	geniculata	98	<i>Traversii</i>	189, 735
<i>Alopecurus</i>	320	Gingidium	97	<i>Areca</i>	288
<i>agrestis</i>	321	<i>rosæfolia</i>	98, 730	<i>Banksii</i>	288
<i>geniculatus</i>	321	<i>Angiopteris erecta</i>	386	<i>sapida</i>	288, 744
<i>Alseuosmia</i>	109	<i>Anictangium repens</i>	424	<i>Arenaria media</i>	25
<i>atriplicifolia</i>	110	<i>Anisotome antipoda</i>	94	<i>Argopsis</i>	563
<i>Banksii</i>	110	<i>aromatica</i>	96	<i>megalospora</i>	563
<i>Ilex</i>	110	<i>geniculata</i>	98	<i>Aristida calycina</i>	330
<i>ligustrifolia</i>	110	<i>Gingidium</i>	97	<i>Aristotelia</i>	33
<i>liuariifolia</i>	110, 731	<i>internedia</i>	94	<i>racemosa</i>	33
<i>macrophylla</i>	109, 731	<i>latifolia</i>	94	<i>Colensoi</i>	33
<i>palaiformis</i>	110	<i>Lyallii</i>	95	<i>fruticosa</i>	33, 726
<i>quercifolia</i>	109, 731	<i>rosæfolia</i>	97	<i>Arnica operina</i>	124
<i>Alsidium</i>	663	<i>Anœctangium</i>	456	<i>Arthonia</i>	589
<i>triangulare</i>	663	<i>compactum</i>	456	<i>albida</i>	590
<i>Alsophila</i>	350	<i>Humboldtii</i>	423	<i>ampliata</i>	590
<i>Colensoi</i>	350	<i>repens</i>	424	<i>astroidea</i>	590
<i>Alteranthera</i>	234	<i>setosum</i>	461	<i>conspicua</i>	591
<i>denticulata</i>	234	<i>Antenuaria</i>	637	<i>excidens</i>	591
<i>sessilis</i>	234	<i>Robinsonii</i>	637	<i>indistincta</i>	590
<i>Amansia</i>	663	<i>Anthericum</i>	285	<i>lobulata</i>	590
<i>marchantioides</i>	663	<i>cirrhatum</i>	285	<i>lurida</i>	589
<i>multifida</i>	663	<i>Hookeri</i>	286, 744	<i>minutula</i>	590
<i>Amaranthaceæ</i>	233	<i>Rossii</i>	286	<i>nigro-cincta</i>	590
<i>Amphiloma</i>	576	<i>Anthistiria australis</i>	325	<i>platygraphella</i>	591
<i>lanuginosum</i>	576	<i>Anthoceros</i>	547, 732	<i>pruinosa</i>	589
<i>Amphiroa</i>	679	<i>Colensoi</i>	548	<i>ramulosa</i>	590
<i>corymbosa</i>	679	<i>giganteus</i>	548	<i>Arthropodium</i>	285
<i>elegans</i>	679	<i>Jamesoni</i>	548	<i>candidum</i>	285
<i>Anacardiaceæ</i>	45	<i>laevis</i>	547	<i>cirrhatum</i>	285
<i>Anagallis arvensis</i>	185	<i>punctatus</i>	548	<i>Arthropteris filipes</i>	380
<i>Anchusa spathulata</i>	193	<i>Anthophycus longifolius</i>	647	<i>tenella</i>	380
<i>Ancistrum dianthrum</i>	56	<i>Anthophyllum Urvillei</i>	303	<i>Arundo</i>	331
<i>anserinaefolium</i>	56	<i>Anthoranthum crini-</i>		<i>australis</i>	331
<i>Andreæa</i>	400	<i>tum</i>	326	<i>conspicua</i>	331, 746
<i>acutifolia</i>	400	<i>odoratum</i>	321	<i>Kakao</i>	331
<i>mutabilis</i>	400	<i>Apeiba australis</i>	32	<i>triodioides</i>	341
<i>nitida</i>	400	<i>Apera</i>	326	<i>Ascarina</i>	253
<i>petrophila</i>	400	<i>arundinacea</i>	326	<i>lucida</i>	253, 740
<i>rupestris</i>	400	<i>crinita</i>	326	<i>Aschersonia</i>	623
<i>subulata</i>	400	<i>Apium</i>	89	<i>duplex</i>	623
<i>Androcryphia porphyro-</i>		<i>australe</i>	90	<i>Ascyrum humifusum</i>	29
<i>rhiza</i>	539	<i>filiforme</i>	90	<i>Aseroe</i>	616
<i>Andromeda rupestris</i>	175	<i>Apluda mutica</i>	3 5	<i>Hookeri</i>	616
<i>Andropogon refractus</i>	325	<i>Apocynææ</i>	187	<i>rubra</i>	616
<i>Androstoma empetrifolium</i>	177	<i>Apophlœa</i>	690	<i>Asparagopsis</i>	678
<i>Aneura</i>	543	<i>Lyallii</i>	690	<i>armata</i>	678
<i>alterniloba</i>	543	<i>Sinclairii</i>	690	<i>Delilei</i>	678
<i>cochleata</i>	544	<i>Arabis gigantea</i>	13	<i>Asperococcus</i>	658
<i>crassa</i>	543	<i>fastigiata</i>	13	<i>echinatus</i>	658
<i>ericaula</i>	544	<i>Araliaceæ</i>	99	<i>Lessonii</i>	659
<i>multifida</i>	543	<i>Aralia crassifolia</i>	101	<i>sinuosus</i>	658
<i>palmata</i>	543	<i>Lessonii</i>	102	<i>Asperula</i>	121
<i>pinnatifida</i>	543	<i>polaris</i>	100	<i>perpusilla</i>	121
<i>prehensilis</i>	543	<i>Schefflera</i>	103	<i>Aspidium</i>	374
<i>Angelica</i>	97	<i>Archera</i>	179	<i>aculeatum</i>	375, 748

	Page		Page		Page
<i>aristatum</i> . . . . .	376	<i>dilatatum</i> . . . . .	623	<i>exigua</i> . . . . .	448
<i>coriaceum</i> . . . . .	376, 749	<i>Atherosperma</i> . . . . .	240	<i>fragilis</i> . . . . .	447
<i>coriaceum</i> , var. . . . .	375	<i>novæ-Zelandiæ</i> . . . . .	240	<i>gigantea</i> . . . . .	449
<i>Cunninghamianum</i> . . . . .	377	<i>Atrichum ligulatum</i> . . . . .	453	<i>Halleriana</i> . . . . .	446
<i>cystostegia</i> . . . . .	376	<i>Atriplex</i> . . . . .	231	<i>Marchica</i> . . . . .	448
<i>hispidum</i> . . . . .	378	<i>Billardieri</i> . . . . .	232, 739	<i>Mossmaniana</i> . . . . .	447
<i>invisum</i> . . . . .	378	<i>cinerea</i> . . . . .	232	<i>papillata</i> . . . . .	447
<i>nymphale</i> . . . . .	377	<i>Halimus</i> . . . . .	232	<i>patens</i> . . . . .	447
<i>oculatum</i> . . . . .	376, 748	<i>patula</i> . . . . .	232	<i>pendula</i> . . . . .	448
<i>pennigerum</i> . . . . .	381	<i>Aulacomnium</i> . . . . .	436	<i>pusilla</i> . . . . .	448
<i>pulcherrimum</i> . . . . .	375	<i>Gaudichaudii</i> . . . . .	436	<i>radicalis</i> . . . . .	448
<i>Richardi</i> . . . . .	375	<i>Aulacopilum</i> . . . . .	456	<i>remotifolia</i> . . . . .	447
<i>Richardi</i> . . . . .	376	<i>glaucom</i> . . . . .	456	<i>robusta</i> . . . . .	447
<i>serra</i> . . . . .	378	<i>Aulicularia oclusa</i> . . . . .	518	<i>Sieberi</i> . . . . .	449
<i>velutinum</i> . . . . .	378	<i>Australina</i> . . . . .	252	<i>tenuis</i> . . . . .	448
<i>waikarens</i> . . . . .	375	<i>novæ-Zelandiæ</i> . . . . .	252	<i>uucinata</i> . . . . .	448
<i>Asplenium</i> . . . . .	370	<i>pusilla</i> . . . . .	252	<i>Batrachospermum</i> . . . . .	717
<i>adiantoides</i> . . . . .	373	<i>Avena antarctica</i> . . . . .	335	<i>moniliforme</i> . . . . .	717
<i>apicidentatum</i> . . . . .	371	<i>filiformis</i> . . . . .	329	<i>Biatora byssoides</i> . . . . .	559
<i>australe</i> . . . . .	374	<i>Forsteri</i> . . . . .	335	<i>ceroplasta</i> . . . . .	583
<i>Brownii</i> . . . . .	374	<i>quadriseta</i> . . . . .	330	<i>Colensoi</i> . . . . .	584
<i>bulbiferum</i> . . . . .	373, 748	<i>sativa</i> . . . . .	336	<i>decipiens</i> . . . . .	583
<i>caudatum</i> . . . . .	372	<i>Avicennia</i> . . . . .	224	<i>marginifera</i> . . . . .	583
<i>Colensoi</i> . . . . .	373	<i>officinalis</i> . . . . .	224	<i>pachycarpa</i> . . . . .	585
<i>falcatum</i> . . . . .	372, 748	<i>resinifera</i> . . . . .	224	<i>rosella</i> . . . . .	583
<i>flabellifolium</i> . . . . .	372	<i>tomentosa</i> . . . . .	224	<i>pyrophthalma</i> . . . . .	582
<i>flabelliforme</i> . . . . .	372	<i>Azolla</i> . . . . .	392	<i>vernalis</i> . . . . .	582
<i>flaccidum</i> . . . . .	374, 748	<i>rubra</i> . . . . .	392	<i>anomala</i> . . . . .	582
<i>flaccidum</i> , $\beta$ . . . . .	371	<i>Bæomyces</i> . . . . .	559	<i>Bidens</i> . . . . .	138
<i>heterophyllum</i> . . . . .	374	<i>roseus</i> . . . . .	559	<i>pilosa</i> . . . . .	138
<i>Hookerianum</i> . . . . .	372, 748	<i>rufus</i> . . . . .	559	<i>Blechnum procerum</i> . . . . .	366
<i>laxum</i> . . . . .	373	<i>Balanophoræ</i> . . . . .	255	<i>Blindia antarctica</i> . . . . .	404
<i>lucidum</i> . . . . .	371	<i>Balantiopsis</i> . . . . .	751	<i>contecta</i> . . . . .	405
<i>obliquum</i> . . . . .	371	<i>erinacca</i> . . . . .	753	<i>Blossevillea caudata</i> . . . . .	651
<i>obtusatum</i> . . . . .	371, 748	<i>Ballia</i> . . . . .	709	<i>monilifera</i> . . . . .	651
<i>polyodon</i> . . . . .	372	<i>Brunonis</i> . . . . .	710	<i>retorta</i> . . . . .	651
<i>Raoulii</i> , var. . . . .	373	<i>callitricha</i> . . . . .	710	<i>retroflera</i> . . . . .	651
<i>Richardi</i> . . . . .	373	<i>Hombroiana</i> . . . . .	710	<i>torulosa</i> . . . . .	651
<i>scleropium</i> . . . . .	371	<i>scoparia</i> . . . . .	710	<i>Blyttia Lyellii</i> . . . . .	541
<i>Shuttleworthianum</i> . . . . .	374	<i>Bangia</i> . . . . .	716	<i>ziphioides</i> . . . . .	541
<i>tremulum</i> . . . . .	373	<i>ciliaris</i> . . . . .	716	<i>Bolbophyllum</i> . . . . .	262
<i>Trichomanes</i> . . . . .	371	<i>lanuginosa</i> . . . . .	716	<i>pygmæum</i> . . . . .	263
<i>triste</i> . . . . .	373	<i>Banksia tomentosa</i> . . . . .	243	<i>Boraginæ</i> . . . . .	191
<i>Astelia</i> . . . . .	283	<i>Barbarea</i> . . . . .	11	<i>Borrera chrysophthalma</i> . . . . .	572
<i>Banksii</i> . . . . .	284, 744	<i>vulgaris</i> . . . . .	11	<i>flavicans</i> . . . . .	572
<i>Cunninghamii</i> . . . . .	283, 743	<i>australis</i> . . . . .	11	<i>leucomela</i> . . . . .	572
<i>linearis</i> . . . . .	284	<i>Bartramia</i> . . . . .	446	<i>Bossiaæ scolopendra</i> . . . . .	50
<i>nervosa</i> . . . . .	284, 744	<i>acerosa</i> . . . . .	447	<i>Bostrychia</i> . . . . .	665
<i>Solandri</i> . . . . .	284, 744	<i>affinis</i> . . . . .	448	<i>Arbuscula</i> . . . . .	765
<i>Aster coriaceus</i> . . . . .	132	<i>appressa</i> . . . . .	447	<i>distans</i> . . . . .	665
<i>furfuraceus</i> . . . . .	125	<i>australis</i> . . . . .	448	<i>Harveyi</i> . . . . .	665
<i>holosericeus</i> . . . . .	130	<i>comosa</i> . . . . .	449	<i>mixta</i> . . . . .	665
<i>Asterina</i> . . . . .	630	<i>consimilis</i> . . . . .	449	<i>Botrychium</i> . . . . .	386
<i>fragilissima</i> . . . . .	630	<i>crassinervia</i> . . . . .	447	<i>australe</i> . . . . .	387
<i>sublibera</i> . . . . .	630	<i>divaricata</i> . . . . .	449	<i>cicutarium</i> . . . . .	387, 750
<i>torulosa</i> . . . . .	630	<i>elongata</i> . . . . .	449	<i>dissectum</i> . . . . .	387
<i>Asteroma</i> . . . . .	623			<i>lunarioides</i> . . . . .	387



	Page		Page		Page
<i>virginicum</i> . . . . .	387	pyriforme . . . . .	438	Calorophus . . . . .	294
<i>Botryodendrum Sinclairii</i> 104		rufescens . . . . .	439	elongata . . . . .	295
Bovista . . . . .	618	tenuifolium . . . . .	441	minor . . . . .	295
brunnea . . . . .	618	torqueseus . . . . .	441	<i>Calosciadium latifolium</i> . . . . .	94
Brachycome . . . . .	137	truncorum . . . . .	439	<i>antipodium</i> . . . . .	95
odorata . . . . .	138	varium . . . . .	444	Calothrix . . . . .	719
pinnata . . . . .	138	Wahlenbergii . . . . .	439	scopulorum . . . . .	720
<i>radigata</i> , $\beta$ . . . . .	138	Byssocaulon . . . . .	581	Caltha . . . . .	9
Sinclairii . . . . .	137	filamentosum . . . . .	581	novæ-Zelandiæ . . . . .	9
Brachyglottis . . . . .	163	<i>Cænopteris flaccida</i> . . . . .	374	<i>Calystegia marginata</i> . . . . .	198
Rani . . . . .	126	novæ-Zelandiæ . . . . .	374	sepium . . . . .	197
repanda . . . . .	163, 734	Caladenia . . . . .	267	soldanella . . . . .	198
Brachymenium . . . . .	437	bifolia . . . . .	267, 741	<i>Tuguriorum</i> . . . . .	198
coarctatum . . . . .	437	Lyallii . . . . .	267	Campanulacææ . . . . .	169
<i>Brathys Forsteri</i> . . . . .	29	minor . . . . .	267	<i>Campanula gracilis</i> . . . . .	170
Braunia . . . . .	423	<i>Calamagrostis conspicua</i> 331		saxicola . . . . .	170
Humboldtii . . . . .	423	Calceolaria . . . . .	201	Campylopus . . . . .	413
Braya . . . . .	13	repens . . . . .	202	appressifolius . . . . .	414
novæ-Zelandiæ . . . . .	13, 724	Sinclairii . . . . .	202, 738	atro-virens . . . . .	414
<i>Bromidium quadrisetum</i> 330		<i>Calea leptophylla</i> . . . . .	145	bicolor . . . . .	415
Bromus . . . . .	341	<i>Calendula pumila</i> . . . . .	137	clavatus . . . . .	414
arenarius . . . . .	341	Calicium . . . . .	558	clavatus . . . . .	414
australis . . . . .	342	curtium . . . . .	558	introflexus . . . . .	414
mollis . . . . .	342	Calliblepharis . . . . .	686	leptodus . . . . .	416
racemosus . . . . .	342	tenuifolia . . . . .	686	pallidus . . . . .	414
Brym . . . . .	437	Callithamnion . . . . .	710	torfaceus . . . . .	415
albescens . . . . .	440	applicitum . . . . .	711	torquatus . . . . .	414
annulatum . . . . .	443	brachygonum . . . . .	712	<i>xanthophyllus</i> . . . . .	414
argenteum . . . . .	441	byssoidium . . . . .	712	<i>Capea biruncinata</i> . . . . .	656
atro-purpureum . . . . .	449	Colensoi . . . . .	712	flabelliformis . . . . .	656
<i>bartramoides</i> . . . . .	446	consanguineum . . . . .	712	radiata . . . . .	656
Billardieri . . . . .	439	cryptopterum . . . . .	711	<i>Richardiana</i> . . . . .	656
bimum . . . . .	441	flaccidum . . . . .	710	Capnodium . . . . .	636
blandum . . . . .	441	gracile . . . . .	711	fibrosus . . . . .	636
cæspitium . . . . .	442	hirtum . . . . .	711	Caprifoliaceæ . . . . .	109
campylothecium . . . . .	439	micropterum . . . . .	711	Cardamine . . . . .	11
chrysouneuron . . . . .	443	pectinatum . . . . .	711	depressa . . . . .	12
clavatum . . . . .	442	Plumula . . . . .	711	divaricata . . . . .	12
coarctatum . . . . .	437	puniceum . . . . .	711	fastigiata . . . . .	13
crassinerve . . . . .	440	Rothii . . . . .	710	hirsuta . . . . .	12
crassum . . . . .	442	<i>scoparium</i> . . . . .	710	stylosa . . . . .	12
creberrimum . . . . .	442	Callitriche . . . . .	68	Carex . . . . .	310
crudum . . . . .	440	verna . . . . .	68, 728	acicularis . . . . .	312
curvicollum . . . . .	442	Callixene . . . . .	281	appressa . . . . .	313, 746
dichotomum . . . . .	443	parviflora . . . . .	281	breviculmis . . . . .	316
duriusculum . . . . .	443	Callophyllis . . . . .	697	cataractæ . . . . .	315
erythrocarpum . . . . .	443	acanthocarpa . . . . .	697	Colensoi . . . . .	312
eximium . . . . .	440	asperata . . . . .	698	collata . . . . .	313
flaccidum . . . . .	444	coccinea . . . . .	697	debilis . . . . .	315
incurvifolium . . . . .	444	dichotoma . . . . .	693	dissita . . . . .	316
intermedium . . . . .	444	erosa . . . . .	698	fascicularis . . . . .	315
lævigatum . . . . .	440	Gunnii . . . . .	694	Forsteri . . . . .	315, 746
leptothecium . . . . .	439	Hombroniana . . . . .	697	Gaudichaudiana . . . . .	313
mucronatum . . . . .	442	variegata . . . . .	697	geminata . . . . .	314
nutans . . . . .	440	Calomnion . . . . .	490	iuversa . . . . .	312
obconicum . . . . .	440	lætum . . . . .	490	Lambertiana . . . . .	317, 746
pachytheca . . . . .	443			littorea . . . . .	315

	Page		Page		Page
<i>lucida</i> . . . . .	314	<i>Catenella</i> . . . . .	705	<i>erecta</i> . . . . .	65
<i>Neesiana</i> . . . . .	316, 746	<i>Opuntia</i> . . . . .	706	<i>incana</i> . . . . .	65
<i>pumila</i> . . . . .	315	<i>Catharinea innoxans</i> . . . . .	454	<i>Cetraria aculeata</i> . . . . .	565
<i>punctulata</i> . . . . .	315	<i>Catharomnion ciliatum</i> . . . . .	489	<i>saxipicola</i> . . . . .	565
<i>pyrenaica</i> . . . . .	312	<i>Caulacanthus</i> . . . . .	688	<i>Chætomium</i> . . . . .	637
<i>Raoulii</i> . . . . .	314	<i>spinellus</i> . . . . .	688	<i>amphitricum</i> . . . . .	637
<i>recurva</i> . . . . .	315	<i>Caulerpa</i> . . . . .	712	<i>elatum</i> . . . . .	637
<i>secta</i> . . . . .	313	<i>articulata</i> . . . . .	713	<i>Chætomorpha ærea</i> . . . . .	719
<i>Solandri</i> . . . . .	316	<i>Brownii</i> . . . . .	713	<i>Darwinii</i> . . . . .	719
<i>stellulata</i> . . . . .	312, 746	<i>furcifolia</i> . . . . .	713	<i>valida</i> . . . . .	719
<i>subdola</i> . . . . .	314	<i>hypnoides</i> . . . . .	713	<i>Chætophora cristata</i> . . . . .	496
<i>teretiusecula</i> . . . . .	313	<i>sedoides</i> . . . . .	713	<i>Chætospora axillaris</i> . . . . .	298
<i>ternaria</i> . . . . .	314	<i>Selago</i> . . . . .	713	<i>concinna</i> . . . . .	299
<i>testacea</i> . . . . .	314	<i>Celmisia</i> . . . . .	129	<i>imberbis</i> . . . . .	298
<i>trifida</i> . . . . .	316, 746	<i>bellidioides</i> . . . . .	135	<i>nitens</i> . . . . .	299
<i>uncinata</i> . . . . .	309	<i>coriacea</i> . . . . .	132	<i>tenax</i> . . . . .	298
<i>vacillans</i> . . . . .	317	<i>densiflora</i> . . . . .	130	<i>Tendo</i> . . . . .	298
<i>virgata</i> . . . . .	313	<i>discolor</i> . . . . .	131	<i>Champia</i> . . . . .	674
<i>Carmichaelia</i> . . . . .	48	<i>glandulosa</i> . . . . .	135	<i>affinis</i> . . . . .	675
<i>australis</i> . . . . .	50	<i>gracilentata</i> . . . . .	134	<i>Kaliformis</i> . . . . .	675
<i>australis</i> . . . . .	49, 50	<i>Haastii</i> . . . . .	131	<i>novæ-Zelandiæ</i> . . . . .	674
<i>crassicaulis</i> . . . . .	48	<i>Hectori</i> . . . . .	135	<i>obsolata</i> . . . . .	675
<i>Cunninghamii</i> . . . . .	50	<i>hieracifolia</i> . . . . .	131	<i>parvula</i> . . . . .	675
<i>flagelliformis</i> . . . . .	50	<i>holosericea</i> . . . . .	130, 732	<i>Chandonanthus</i> . . . . .	750
<i>grandiflora</i> . . . . .	49, 727	<i>incana</i> . . . . .	131	<i>Chara</i> . . . . .	550
<i>junceæ</i> . . . . .	50	<i>laricifolia</i> . . . . .	135	<i>australis</i> . . . . .	550
<i>Munroi</i> . . . . .	49	<i>Lindsayi</i> . . . . .	132	<i>contraria</i> . . . . .	550
<i>nana</i> . . . . .	49	<i>longifolia</i> . . . . .	134	<i>fetida</i> . . . . .	550
<i>odorata</i> . . . . .	50, 727	<i>Lyallii</i> . . . . .	133, 732	<i>Characæ</i> . . . . .	549
<i>pilosa</i> . . . . .	49	<i>Mackaui</i> . . . . .	133	<i>Chauvinia hypnoides</i> . . . . .	713
<i>stricta</i> . . . . .	50	<i>Munroi</i> . . . . .	133	<i>Cheilautes</i> . . . . .	362
<i>Carpha</i> . . . . .	299	<i>petiolata</i> . . . . .	134, 732	<i>ambigua</i> . . . . .	361, 381
<i>alpina</i> . . . . .	299	<i>ramulosa</i> . . . . .	733	<i>arborescens</i> . . . . .	361
<i>Carpodetus</i> . . . . .	59	<i>sessiliflora</i> . . . . .	135	<i>dicksonioides</i> . . . . .	361
<i>serratus</i> . . . . .	59	<i>Sinclairii</i> . . . . .	132	<i>pellucida</i> . . . . .	361
<i>Carpomitra</i> . . . . .	654	<i>spectabilis</i> . . . . .	134	<i>Sieberi</i> . . . . .	362
<i>Cabrerae</i> . . . . .	654	<i>Traversii</i> . . . . .	134, 732	<i>tenuifolia</i> . . . . .	362, 748
<i>Halyseris</i> . . . . .	655	<i>verbascifolia</i> . . . . .	132	<i>Chenopodiaceæ</i> . . . . .	229
<i>Carpophyllum</i> . . . . .	649	<i>vernica</i> . . . . .	136	<i>Chenopodium</i> . . . . .	229
<i>flexuosum</i> . . . . .	649	<i>viscosa</i> . . . . .	133, 732	<i>ambiguum</i> . . . . .	230
<i>macrophyllum</i> . . . . .	649	<i>Cenangium</i> . . . . .	629	<i>ambrosioides</i> . . . . .	230
<i>Maschalocarpus</i> . . . . .	649	<i>Colensoi</i> . . . . .	629	<i>australe</i> . . . . .	231
<i>Phyllanthus</i> . . . . .	649	<i>Cenomyce aggregata</i> . . . . .	561	<i>Botrys</i> . . . . .	231
<i>Carumbium</i> . . . . .	248	<i>capillata</i> . . . . .	561	<i>carinatum</i> . . . . .	231
<i>polyandrum</i> . . . . .	248, 740	<i>Centroceras</i> . . . . .	708	<i>glaucum</i> . . . . .	230
<i>Caryophylleæ</i> . . . . .	22	<i>clavulatum</i> . . . . .	708	<i>maritimum</i> . . . . .	231
<i>Cassinia</i> . . . . .	144	<i>Ceramium</i> . . . . .	707	<i>pusillum</i> . . . . .	231
<i>fulvida</i> . . . . .	145	<i>cancellatum</i> . . . . .	708	<i>triandrum</i> . . . . .	230, 739
<i>leptophylla</i> . . . . .	145	<i>diaphanum</i> . . . . .	707	<i>urbicum</i> . . . . .	230
<i>leptophylla</i> . . . . .	145	<i>rubrum</i> . . . . .	707	<i>Chiloglottis</i> . . . . .	269
<i>retorta</i> . . . . .	145	<i>uncinatum</i> . . . . .	708	<i>cornuta</i> . . . . .	269
<i>Vauvilliersii</i> . . . . .	145	<i>vestitum</i> . . . . .	708	<i>Traversii</i> . . . . .	741
<i>Cassytha</i> . . . . .	239	<i>virgatum</i> . . . . .	707	<i>Chiloscyphus</i> . . . . .	514, 751
<i>pauciculata</i> . . . . .	239	<i>Ceratella rosulata</i> . . . . .	139	<i>aculeatus</i> . . . . .	515
<i>Castroalia Salicornioides</i> . . . . .	650	<i>Ceratodon</i> . . . . .	422	<i>amphibolius</i> . . . . .	508
<i>Catabrosa</i> . . . . .	336	<i>purpureus</i> . . . . .	422	<i>australis</i> . . . . .	510
<i>antarctica</i> . . . . .	336	<i>Cercodia alternifolia</i> . . . . .	65	<i>biciliatus</i> . . . . .	509

	Page		Page		Page
Billardieri . . . . .	515	oblongifolia . . . . .	677	Colensoi . . . . .	2
<i>canaliculatus</i> . . . . .	509	Cladium . . . . .	303	<i>Colensoi</i> . . . . .	2
chlorophyllus . . . . .	517	articulatum . . . . .	304	fœtida . . . . .	2
coalitus . . . . .	516	glomeratum . . . . .	304	<i>hexapetala</i> . . . . .	2
Colensoi . . . . .	753	Gunnii . . . . .	304	hexasepala . . . . .	2, 722
cymbiferus . . . . .	518	junceum . . . . .	305	<i>hexasepala</i> . . . . .	3
decipiens . . . . .	516	Sinclairii . . . . .	305	indivisa . . . . .	2
echinellus . . . . .	517	teretifolium . . . . .	304	<i>integrifolia</i> . . . . .	2
fissistipus . . . . .	515	Cladomnion . . . . .	458	parviflora . . . . .	2
laxus . . . . .	517	ericoides . . . . .	458	Clianthus . . . . .	52
<i>leucophyllus</i> . . . . .	509	sciuroides . . . . .	458	punicus . . . . .	52
Lyallii . . . . .	516	<i>setosum</i> . . . . .	461	<i>Climacium sulcatum</i> . . . . .	464
Menziesii . . . . .	514	Cladonia . . . . .	560	Coccocarpia . . . . .	576
<i>oblongifolius</i> . . . . .	515	aggregata . . . . .	561, 755	molybdæa . . . . .	576
odoratus . . . . .	516	capitellata . . . . .	561	? <i>pulchella</i> . . . . .	591
physanthus . . . . .	517	cariosa . . . . .	560	<i>Coccoloba australis</i> . . . . .	236
piperitus . . . . .	517	cornucopioides . . . . .	561	Codium . . . . .	713
polycladus . . . . .	516	decorticata . . . . .	560	adhærens . . . . .	714
sinuosus . . . . .	515	<i>degenerans</i> . . . . .	560	tomentosum . . . . .	714
supinus . . . . .	515	digitata . . . . .	562	<i>Codonoblepharum Men-</i>	
tridentatus . . . . .	517	fimbriata . . . . .	560	<i>ziesii</i> . . . . .	435
trispinosus . . . . .	516	furcata . . . . .	560	Cœnogonium . . . . .	581
Chloranthaceæ . . . . .	253	gracilis . . . . .	560	inflexum . . . . .	581
Chondria . . . . .	677	macilenta . . . . .	562	Linkii . . . . .	581
flagellaris . . . . .	677	pyxidata . . . . .	560	Colensoa . . . . .	170
macrocarpa . . . . .	677	rangiferina . . . . .	561	physaloides . . . . .	170
<i>Chondroclonium Chauvini</i> . . . . .	699	retipora . . . . .	561	Collema . . . . .	556
<i>Chondrococcus abscissus</i> . . . . .	688	<i>sarmentosa</i> . . . . .	560	contiguum . . . . .	557
<i>coccineus</i> . . . . .	698	squamosa . . . . .	561	fasciculare . . . . .	557
Chondrus . . . . .	701	uncialis . . . . .	562	flaccidum . . . . .	557
<i>alveatus</i> . . . . .	699	verticillata . . . . .	560	<i>glaucothalamum</i> . . . . .	557
tuberculosus . . . . .	701	Cladophora . . . . .	717	<i>leucocarpum</i> . . . . .	557
variolosus . . . . .	701	<i>catenifera</i> . . . . .	718	nigrescens . . . . .	557
vermicularis . . . . .	697	Colensoi . . . . .	718	plicatile . . . . .	557
Chorda . . . . .	658	crinalis . . . . .	718	pulposum . . . . .	557
lomentaria . . . . .	659	Daviesii . . . . .	718	Saturninum . . . . .	558
Chordaria . . . . .	659	gracilis . . . . .	718	Colobanthus . . . . .	24
flagelliformis . . . . .	660	herpestica . . . . .	717	acicularis . . . . .	25, 725
sordida . . . . .	659	Lyallii . . . . .	717	Billardieri . . . . .	25, 725
Chroolepus aureus . . . . .	756	pacifica . . . . .	717	muscoides . . . . .	25
<i>Chrysobactron Hookeri</i> . . . . .	286	pellucida . . . . .	717	quitensis . . . . .	25
<i>Rossii</i> . . . . .	285	verticillata . . . . .	718	subulatus . . . . .	25
Chrysomenia . . . . .	703	virgata . . . . .	718	Colocasia antiquorum . . . . .	767
? polydactyla . . . . .	703	Cladosporium . . . . .	626	Compositæ . . . . .	121
<i>secunda</i> . . . . .	703	herbarum . . . . .	627	Conferva . . . . .	718
Chylocladia . . . . .	702	Clavaria . . . . .	614	ærea . . . . .	719
affinis . . . . .	675	arborescens . . . . .	614	<i>clavata</i> . . . . .	719
? caespitosa . . . . .	703	Colensoi . . . . .	615	Darwinii . . . . .	719
<i>Novæ-Zelandiæ</i> . . . . .	674	crispula . . . . .	615	<i>gelatinosa</i> . . . . .	717
parvula . . . . .	675	flaccida . . . . .	615	<i>herpestica</i> . . . . .	717
secunda . . . . .	702	flagelliformis . . . . .	614	valida . . . . .	719
umbellata . . . . .	702	inaequalis . . . . .	615	<i>virgata</i> . . . . .	718
<i>Cineraria repanda</i> . . . . .	163	lutea . . . . .	614	Coniferæ . . . . .	255
<i>rotundifolia</i> . . . . .	162	Pusio . . . . .	614	Conomitrium . . . . .	408
Cladhymenia . . . . .	677	Claytonia . . . . .	26	Dillenii . . . . .	408
Gunnii . . . . .	694	australasica . . . . .	26	Conostomum . . . . .	445
Lyallii . . . . .	677	Clematis . . . . .		australe . . . . .	445

	Page		Page		Page
<i>parvulum</i> . . . . .	445	<i>indivisa</i> . . . . .	282, 743	Cruciferae . . . . .	10
<i>pusillum</i> . . . . .	445	<i>Pumilio</i> . . . . .	282, 743	Cryphaea . . . . .	460
Convolvulaceae . . . . .	197	<i>stricta</i> . . . . .	743	<i>acuminata</i> . . . . .	461
Convolvulus . . . . .	197	<i>stricta</i> . . . . .	282	<i>consimilis</i> . . . . .	460
<i>erubescens</i> . . . . .	198, 738	Coriaria . . . . .	46	<i>dilatata</i> . . . . .	461
<i>marginata</i> . . . . .	198	<i>angustissima</i> . . . . .	47, 727	<i>parvula</i> . . . . .	460
<i>Sepium</i> . . . . .	197	<i>ruscifolia</i> . . . . .	46, 727	<i>tasmanica</i> . . . . .	461
<i>Soldanella</i> . . . . .	198	<i>sarmentosa</i> . . . . .	47	<i>Cryptopteleura minus</i> . . . . .	684
<i>Tuguriorum</i> . . . . .	198, 738	<i>thymifolia</i> . . . . .	47, 727	Cryptopodium . . . . .	445
<i>Cookia Gnidia</i> . . . . .	243	Coriariæ . . . . .	46	<i>bratramioides</i> . . . . .	446
Coprinus . . . . .	604	Corneæ . . . . .	104	<i>Ctenodus Labillardieri</i> . . . . .	686
<i>Colensoi</i> . . . . .	604	Corokia . . . . .	105	Cucurbitaceæ . . . . .	82
<i>fimetarius</i> . . . . .	604	<i>buddleoides</i> . . . . .	106	Cucurbita . . . . .	759
Coprosma . . . . .	110	Cotoneaster . . . . .	106	Cupuliferæ . . . . .	248
<i>acerosa</i> . . . . .	118	Corticium . . . . .	613	Cuscuta . . . . .	199
<i>acutifolia</i> . . . . .	114	<i>læve</i> . . . . .	613	<i>densiflora</i> . . . . .	199
<i>affinis</i> . . . . .	117	<i>ocbroleucum</i> . . . . .	613	Cyathea . . . . .	348
<i>Baueriana</i> . . . . .	112	<i>polygonium</i> . . . . .	613	<i>Cunninghamii</i> . . . . .	350, 747
<i>ciliata</i> . . . . .	115	<i>rhabdobarbium</i> . . . . .	613	<i>dealbata</i> . . . . .	349, 747
<i>Colensoi</i> . . . . .	117	<i>tenerum</i> . . . . .	613	<i>medullaris</i> . . . . .	349, 747
<i>cuneata</i> . . . . .	117	<i>viride</i> . . . . .	613	<i>Milnei</i> . . . . .	349
<i>Cunninghamii</i> . . . . .	113	Corynocarpus . . . . .	46	<i>Smithii</i> . . . . .	350
<i>depressa</i> . . . . .	118	<i>lævigata</i> . . . . .	46	Cyathodes . . . . .	176
<i>divaricata</i> . . . . .	115	Corysanthes . . . . .	265	<i>acerosa</i> . . . . .	176
<i>fœtidissima</i> . . . . .	116	<i>macrantha</i> . . . . .	266	<i>acerosa, β</i> . . . . .	177
<i>fœtidissima</i> . . . . .	113	<i>oblonga</i> . . . . .	266	<i>Colensoi</i> . . . . .	177
<i>gracilis</i> . . . . .	115	<i>rivularis</i> . . . . .	266	<i>empetrifolia</i> . . . . .	177
<i>grandifolia</i> . . . . .	112	<i>rotundifolia</i> . . . . .	266	<i>? pumila</i> . . . . .	735
<i>linariifolia</i> . . . . .	118	<i>triloba</i> . . . . .	265	<i>robusta</i> . . . . .	177
<i>lucida</i> . . . . .	112	Cotula . . . . .	140	Cyathophorum . . . . .	489
<i>microcarpa</i> . . . . .	118	<i>atrata</i> . . . . .	142, 733	<i>pennatum</i> . . . . .	490
<i>myrtillifolia</i> . . . . .	116, 117	<i>australis</i> . . . . .	141	Cyathus . . . . .	621
<i>parviflora</i> . . . . .	116	<i>coronopifolia</i> . . . . .	141	<i>Colensoi</i> . . . . .	621
<i>petiolata</i> . . . . .	113, 731	<i>dioica</i> . . . . .	143, 733	<i>novæ-Zelandiæ</i> . . . . .	621
<i>propinqua</i> . . . . .	116	Featherstonii . . . . .	733	Cynodon Dactylon . . . . .	331
<i>propinqua</i> . . . . .	118	<i>filiformis</i> . . . . .	142	<i>Cynoglossum nobile</i> . . . . .	196
<i>pumila</i> . . . . .	119	<i>lanata</i> . . . . .	141, 733	Cyperaceæ . . . . .	296
<i>pusilla</i> . . . . .	117	<i>minor</i> . . . . .	142, 733	Cyperus . . . . .	297
<i>repens</i> . . . . .	119	<i>minuta</i> . . . . .	144	<i>tenellus</i> . . . . .	725
<i>repens</i> . . . . .	117	<i>pectinata</i> . . . . .	142	<i>ustulatus</i> . . . . .	297
<i>rhamnoides</i> . . . . .	115	<i>perpusilla</i> . . . . .	143	Cyphella . . . . .	613
<i>robusta</i> . . . . .	113	<i>plumosa</i> . . . . .	141	<i>densa</i> . . . . .	614
<i>rotundifolia</i> . . . . .	114	<i>pyretbrifolia</i> . . . . .	142	Cyrtopus . . . . .	461
<i>spatulata</i> . . . . .	114	<i>squalida</i> . . . . .	143	<i>setosus</i> . . . . .	461
<i>tenuicaulis</i> . . . . .	115	Crantzia . . . . .	89	Cyrtostylis . . . . .	264
Corallina . . . . .	679	<i>lineata</i> . . . . .	89	<i>oblonga</i> . . . . .	264
<i>armata</i> . . . . .	679	Craspedia . . . . .	144	<i>rotundifolia</i> . . . . .	264
<i>officinalis</i> . . . . .	680	<i>alpina</i> . . . . .	144	Cystophora . . . . .	651
<i>Cuvieri</i> . . . . .	680	<i>fimbriata</i> . . . . .	144	<i>Lyallii</i> . . . . .	651
<i>Hombrovi</i> . . . . .	680	<i>uniflora</i> . . . . .	144	<i>monilifera</i> . . . . .	651
<i>pistillaris</i> . . . . .	680	Crassulaceæ . . . . .	61	<i>Platylobium</i> . . . . .	651
Cordiceps . . . . .	631	<i>Crassula moschata</i> . . . . .	61	<i>retorta</i> . . . . .	651
<i>Robertsii</i> . . . . .	631	Crepis . . . . .	164	<i>retroflexa</i> . . . . .	651
<i>Sinclairii</i> . . . . .	631	<i>novæ-Zelandiæ</i> . . . . .	164	<i>torulosa</i> . . . . .	651
Cordylina . . . . .	281, 742	Crucibulum . . . . .	621	Cystopteris . . . . .	358
<i>australis</i> . . . . .	281, 743	<i>emodense</i> . . . . .	621	<i>fragilis</i> . . . . .	358
<i>Banksii</i> . . . . .	282, 743	<i>vulgare</i> . . . . .	621	<i>Cystoseira retroflexa</i> . . . . .	651



	Page		Page		Page
<i>Cytherexylon perforatum</i>	225	<i>nereifolia</i>	683	<i>Dicranum</i>	409
<i>Dacrydium</i>	258	<i>oppositifolia</i>	683	<i>Billardieri</i>	412
<i>Colensoi</i>	259, 741	<i>pleurospora</i>	682	<i>brachypelma</i>	413
<i>cupressinum</i>	258, 741	<i>quercifolia</i>	682	<i>campylophyllum</i>	411
<i>laxifolium</i>	259	<i>ruscifolia</i>	683	<i>candidum</i>	409
<i>plumosum</i>	256	<i>Delisea</i>	678	<i>clathratum</i>	411
<i>taxifolium</i>	258	<i>elegans</i>	678	<i>dicarpon</i>	411
<i>Dactylanthus</i>	255	<i>Dendrobium</i>	262	<i>dichotomum</i>	413
<i>Taylori</i>	255	<i>biflorum</i>	262	<i>fasciatum</i>	412
<i>Dædalea</i>	610	<i>Cunninghamii</i>	262	<i>flexifolium</i>	417
<i>confragosa</i>	610	<i>pygmaeum</i>	263	<i>incanum</i>	410
<i>pendula</i>	610	<i>Dendroceros leptohyme-</i>		<i>leucolomoides</i>	411
<i>Daltonia</i>	496	<i>nus</i>	548	<i>Menziesii</i>	412
<i>nervosa</i>	496	<i>Deschampsia</i>	334	<i>pungens</i>	412
<i>novæ-Zelandiæ</i>	496	<i>cæspitosa</i>	334, 746	<i>robustum</i>	411
<i>Dammara</i>	256, 740	<i>Desmarestia</i>	655	<i>Schreberi</i>	411
<i>australis</i>	256	<i>ligulata</i>	655	<i>setosum</i>	412
<i>Danthonia</i>	331	<i>viridis</i>	655	<i>Sieberianum</i>	410
<i>antarctica</i>	332, 335	<i>Desmatodon</i>	421	<i>tasmanicum</i>	410
<i>bromioides</i>	332	<i>nervosus</i>	421	<i>trichopodium</i>	411
<i>Buchanani</i>	333	<i>Desmoschænus</i>	303	<i>vaginatum</i>	411
<i>cingula</i>	333	<i>spiralis</i>	303, 745	<i>Dictymia lanceolata</i>	381
<i>Cunninghamii</i>	332, 746	<i>Deyeuxia æmula</i>	329	<i>Dictyosiphon</i>	658
<i>flavescens</i>	332	<i>Billardieri</i>	329	<i>? fasciculatus</i>	658
<i>gracilis</i>	333	<i>Forsteri</i>	329	<i>Dictyota</i>	657
<i>Gunniana</i>	333	<i>setifolia</i>	329	<i>dichotoma</i>	657
<i>nuda</i>	333	<i>Dianella</i>	283	<i>Kunthii</i>	657
<i>pallida</i>	335	<i>intermedia</i>	283, 743	<i>Diderma</i>	620
<i>pilosa</i>	333	<i>Diatrype</i>	632	<i>Hookeri</i>	620
<i>Raoulii</i>	332	<i>glomeraria</i>	633	<i>Didymodon</i>	420
<i>rigida</i>	332	<i>lata</i>	633	<i>cyathicarpus</i>	435
<i>semi-annularis</i>	333	<i>Dicera dentata</i>	34	<i>erubescens</i>	421
<i>semi-annularis</i>	333	<i>Dichelachne</i>	325	<i>interruptus</i>	421
<i>Unarede</i>	333	<i>crinita</i>	326	<i>papillatus</i>	421
<i>Darea flaccida</i>	374	<i>Forsteriana</i>	326	<i>longifolius</i>	418
<i>Dasya</i>	672	<i>rigida</i>	325	<i>Didymium</i>	620
<i>Berkeleyi</i>	673	<i>sciurea</i>	326	<i>australe</i>	620
<i>collabens</i>	672	<i>Sieberiana</i>	326	<i>cinereum</i>	620
<i>squarrosa</i>	673	<i>stipoides</i>	325	<i>Diplax avenacea</i>	320
<i>tessellata</i>	673	<i>vulgaris</i>	326	<i>polynoda</i>	320
<i>Dasyphloea</i>	694	<i>Dichloria viridis</i>	655	<i>Dipololena cladorhizans</i>	541
<i>insignis</i>	694	<i>Dichondra</i>	199	<i>tenuinervis</i>	541
<i>Daucus</i>	98	<i>repens</i>	199	<i>xiphoides</i>	541
<i>brachiatus</i>	99	<i>Dichophyllum dichotoma</i>	658	<i>Disarrhena Antarcticum</i>	321
<i>Davallia</i>	358	<i>Dicksonia</i>	351	<i>Discaria</i>	43
<i>Liudleyi</i>	359	<i>antarctica</i>	351	<i>Toumatou</i>	44, 727
<i>novæ-Zelandiæ</i>	358	<i>fibrosa</i>	351	<i>australis</i>	44
<i>Dawsonia</i>	455	<i>lanata</i>	351	<i>Dissodon callophyllus</i>	452
<i>D'Urvillei</i>	686	<i>squarrosa</i>	351, 747	<i>plagiopus</i>	459
<i>superba</i>	455	<i>Dicnemon</i>	409	<i>Distichium</i>	422
<i>Delesseria</i>	681	<i>calycinum</i>	409	<i>capillaceum</i>	422
<i>crassiuervia</i>	683	<i>Dicranodontium</i>	413	<i>capillaceum</i>	418
<i>Davisii</i>	682	<i>flexipes</i>	413	<i>Ditoca muscosa</i>	234
<i>dichotoma</i>	682	<i>lineare</i>	413	<i>Diuris novæ-Zelandiæ</i>	263
<i>Hookeri</i>	682	<i>proscriptum</i>	413	<i>Dodonæa</i>	44
<i>Lepeurii</i>	682	<i>flexuosum</i>	415	<i>viscosa</i>	45
		<i>leptocephalum</i>	414	<i>spathulata</i>	45

	Page		Page		Page
Douatia . . . . .	58	Dumortiera . . . . .	546, 752	<i>erecta</i> . . . . .	716
novæ-Zelandiæ . . . . .	58, 727	<i>dilatata</i> . . . . .	546	<i>intestinalis</i> . . . . .	716
Doodia . . . . .	369	<i>hirsuta</i> . . . . .	546	<i>ramulosa</i> . . . . .	716
<i>caudata</i> . . . . .	370, 749	D'Urvillæa . . . . .	654	Entodon . . . . .	467
<i>connexa</i> . . . . .	369	<i>utilis</i> . . . . .	654	<i>truncorum</i> . . . . .	467
<i>Kunthiana</i> . . . . .	370	Dysoxylum . . . . .	40	Entosthodon . . . . .	450
<i>media</i> . . . . .	370	<i>spectabile</i> . . . . .	41, 726	<i>gracilis</i> . . . . .	451
Dothidea . . . . .	633	Earina . . . . .	261	Epacris . . . . .	178
<i>Colcusoï</i> . . . . .	633	<i>autumnalis</i> . . . . .	262	<i>alpina</i> . . . . .	179
<i>filicina</i> . . . . .	633	<i>mucronata</i> . . . . .	262, 741	<i>fasciculata</i> . . . . .	178
<i>hemisphærica</i> . . . . .	633	Echinopogon . . . . .	325	<i>longifolia</i> . . . . .	182
<i>Ribesia</i> . . . . .	633	<i>ovatus</i> . . . . .	325	<i>pauciflora</i> . . . . .	179, 735
<i>spilomea</i> . . . . .	633	Ecklonia . . . . .	656	<i>pumila</i> . . . . .	178
<i>Dracena australis</i> . . . . .	282	<i>exasperata</i> . . . . .	656	<i>pungens</i> . . . . .	179
<i>indivisa</i> . . . . .	282	<i>flabelliformis</i> . . . . .	656	<i>purpurascens</i> . . . . .	179
<i>Dracophyllum</i> . . . . .	180	<i>radiata</i> . . . . .	656	<i>Sinclairii</i> . . . . .	179
<i>affine</i> . . . . .	181	<i>Richardiana</i> . . . . .	656	<i>racemosa</i> . . . . .	180
<i>filifolium</i> . . . . .	182	Ectocarpus . . . . .	661	Epicarporus . . . . .	250
<i>latifolium</i> . . . . .	181, 736	<i>coufervoides</i> . . . . .	662	<i>microphyllus</i> . . . . .	250, 740
<i>Lessonianum</i> . . . . .	182	<i>granulosus</i> . . . . .	661	Epicoccum . . . . .	626
<i>longifolium</i> . . . . .	182	<i>ochraceus</i> . . . . .	661	<i>pallescens</i> . . . . .	626
<i>Lyallii</i> . . . . .	182	? <i>pusillus</i> . . . . .	662	Epilobium . . . . .	76
<i>Menziesii</i> . . . . .	181	<i>siliculosus</i> . . . . .	662	<i>alsinoides</i> . . . . .	79
<i>muscoïdes</i> . . . . .	183	<i>Edwardsia grandiflora</i> . . . . .	52	<i>atriplicifolium</i> . . . . .	79
<i>recurvum</i> . . . . .	181	Ehrharta . . . . .	319	<i>Billardierianum</i> . . . . .	81
<i>rosmarinifolium</i> . . . . .	183	<i>Colensoi</i> . . . . .	319	<i>brevipes</i> . . . . .	78
<i>scoparium</i> . . . . .	182	<i>stipoides</i> . . . . .	320	<i>cinereum</i> . . . . .	80
<i>setifolium</i> . . . . .	182	Elæocarpus . . . . .	33	<i>confertifolium</i> . . . . .	78
<i>squarrosus</i> . . . . .	181	<i>Cunninghamii</i> . . . . .	34	<i>confertum</i> . . . . .	80
<i>strictum</i> . . . . .	181, 736	<i>dentatus</i> . . . . .	34	<i>crassum</i> . . . . .	78
<i>subulatum</i> . . . . .	182	<i>Hinaiu</i> . . . . .	34	<i>glabellum</i> . . . . .	79
<i>Traversii</i> . . . . .	736	<i>Hookerianus</i> . . . . .	34	<i>haloragifolium</i> . . . . .	80
<i>Urvilleanum</i> . . . . .	182, 736	<i>Elæodendron micranthus</i> . . . . .	18	<i>hirtigerum</i> . . . . .	80
<i>uniflorum</i> . . . . .	182	Elatineæ . . . . .	28	<i>incanum</i> . . . . .	80
Drapetes . . . . .	245	Elatine . . . . .	28	<i>juncum</i> . . . . .	80
<i>Dieffenbachii</i> . . . . .	245	<i>americana</i> . . . . .	28	<i>linæoides</i> . . . . .	77
<i>Lyallii</i> . . . . .	246	<i>grutioloides</i> . . . . .	28	<i>macranthum</i> . . . . .	81
<i>muscosa</i> . . . . .	246	Elatostemma . . . . .	253	<i>macropus</i> . . . . .	78
Drimys . . . . .	10	<i>rugosum</i> . . . . .	253	<i>melanocaulon</i> . . . . .	80
<i>axillaris</i> . . . . .	10, 724	Eleocharis . . . . .	300	<i>microphyllum</i> . . . . .	79
Drosera . . . . .	63	<i>acuta</i> . . . . .	745	<i>nerteroides</i> . . . . .	77
<i>Arcturi</i> . . . . .	63	<i>gracilis</i> . . . . .	301, 745	<i>nummularifolium</i> . . . . .	77
<i>auriculata</i> . . . . .	64	<i>gracillima</i> . . . . .	745	<i>pallidiflorum</i> . . . . .	81, 728
<i>binata</i> . . . . .	64	<i>sphacelata</i> . . . . .	300	<i>pedunculare</i> . . . . .	77
<i>Cunninghamii</i> . . . . .	64	Eleusine indica . . . . .	331	<i>pubens</i> . . . . .	80
<i>intermedia</i> . . . . .	64	Encalypta . . . . .	422	<i>purpuratum</i> . . . . .	77
<i>propinqua</i> . . . . .	63	<i>australis</i> . . . . .	422	<i>rotundifolium</i> . . . . .	79
<i>pygmæa</i> . . . . .	63	Endocarpum . . . . .	592	<i>tenuipes</i> . . . . .	78
<i>spathulata</i> . . . . .	63	<i>fluviale</i> . . . . .	592	<i>tetragonum</i> . . . . .	80
<i>stenopetala</i> . . . . .	63, 727	<i>hepaticum</i> . . . . .	592	<i>thymifolium</i> . . . . .	79
Droseraceæ . . . . .	62	<i>pusillum</i> . . . . .	592	<i>virgatum</i> . . . . .	80
<i>Dufourea collodes</i> . . . . .	561	Entelea . . . . .	32	Epineuron . . . . .	662
Dumontia . . . . .	706	<i>arborescens</i> . . . . .	32	<i>Colensoi</i> . . . . .	662
<i>cornuta</i> . . . . .	706	Enteromorpha . . . . .	716	? <i>lineatum</i> . . . . .	663
<i>filiformis</i> . . . . .	706	<i>clathrata</i> . . . . .	716	<i>Epipactis porrifolia</i> . . . . .	267
<i>pusilla</i> . . . . .	703	<i>compressa</i> . . . . .	716	Epymenia . . . . .	702
<i>pusilla</i> . . . . .	706			<i>acuta</i> . . . . .	702

	Page		Page		Page
obtusa . . . . .	702	Excipula . . . . .	630	Banksii . . . . .	275, 742
Eragrostis eximia . . . . .	344	gregaria . . . . .	631	Frullania . . . . .	534, 752
Erechtites . . . . .	156	nigro-rufa . . . . .	630	allophylla . . . . .	538, 755
arguta . . . . .	157	Exocarpus . . . . .	246	aterrima . . . . .	538
hispidula . . . . .	157	Bidwillii . . . . .	246	congesta . . . . .	538
prenanthoides . . . . .	156			cornigera . . . . .	535
quadridentata . . . . .	157	Fabronia . . . . .	456	cranialis . . . . .	536
scaberula . . . . .	157, 734	australis . . . . .	456	deplanata . . . . .	536
Eremodon . . . . .	451	Fagus . . . . .	249	falciloba . . . . .	536
octoblepharis . . . . .	452	cliffortioides . . . . .	250, 740	fugax . . . . .	537
purpurascens . . . . .	452	fusca . . . . .	249	gracilis . . . . .	539
robustus . . . . .	452	Menziesii . . . . .	249	Hampeana . . . . .	536
Ericæ . . . . .	173	Solandri . . . . .	250	hypoleuca . . . . .	537
Eriostemon dentatum . . . . .	34	Favolus . . . . .	610	incumbens . . . . .	537
Eryngium . . . . .	90	intestinalis . . . . .	610	magellanica . . . . .	538
vesiculosum . . . . .	90, 729	Fegatella australis . . . . .	544	myosota . . . . .	537
Erisiphe . . . . .	636	Festuca . . . . .	340	patula . . . . .	535
densa . . . . .	637	bromoides . . . . .	341	pentapleura . . . . .	537
Eucladon complanatum . . . . .	490	duriuscula . . . . .	341	ptychantha . . . . .	537
Euctenodus Labillardieri . . . . .	686	foliosa . . . . .	338	pycnantha . . . . .	535
Eugenia . . . . .	74	littoralis . . . . .	341, 746	reptans . . . . .	536
Maire . . . . .	74	scoparia . . . . .	341	reticulata . . . . .	538, 755
obcordata . . . . .	74	scabra . . . . .	343	rostellata . . . . .	755
Vitis-Idæa . . . . .	74	Ficoideæ . . . . .	83	rostrata . . . . .	538
Eukymenia Harveyana . . . . .	698	Filices . . . . .	344	scandens . . . . .	535
Euphorbiaceæ . . . . .	247	Fimbriaria . . . . .	546, 752	spinifera . . . . .	536
Euphorbia . . . . .	247	australis . . . . .	547	squarrosula . . . . .	535
glauca . . . . .	248, 740	Drummondii . . . . .	546	Fuchsia . . . . .	75
Euphrasia . . . . .	219	tenera . . . . .	547	Coleus . . . . .	728
antarctica . . . . .	220	Fimbristylis . . . . .	303	excorticata . . . . .	75, 728
cuneata . . . . .	219	dichotoma . . . . .	303	procumbens . . . . .	76, 728
Munroi . . . . .	220	velata . . . . .	303	Fucodium . . . . .	652
repens . . . . .	221	Fissidens . . . . .	406	chondrophyllum . . . . .	652
revoluta . . . . .	220	adiantoides . . . . .	406	gladiatum . . . . .	652
Euptilota formosissima . . . . .	709	æruginosus . . . . .	408	Fucus abscissus . . . . .	688
Eurybia furfuracea . . . . .	125	asplenoides . . . . .	406	alveatus . . . . .	699
albida . . . . .	128	brevifolius . . . . .	408	Antarcticus . . . . .	654
alpina . . . . .	126	bryoides . . . . .	408	bracteatus . . . . .	700
avicenniæfolia . . . . .	127	dealbatus . . . . .	407	chondrophyllus . . . . .	652
Cunninghamii . . . . .	196	incurvus . . . . .	408	comosus . . . . .	650
dentata, α . . . . .	126	ligulatus . . . . .	406	Forsteri . . . . .	676
dentata, β . . . . .	126	oblongifolius . . . . .	407	gladiatus . . . . .	652
flavicans . . . . .	572	pallidus . . . . .	407	interruptus . . . . .	657
Forsteri . . . . .	127	pulvinatus . . . . .	425	ligulatus . . . . .	655
nitida . . . . .	125	rigidulus . . . . .	407	lineatus . . . . .	633
nummularifolia . . . . .	127	tenellus . . . . .	407	lividus . . . . .	699
virgata . . . . .	128	viridulus . . . . .	408	longifolius . . . . .	647
Euthorea membranacea . . . . .	694	Fissurina inquinata . . . . .	586	moniliferus . . . . .	651
Evernia ochroleuca . . . . .	564	insidiosa . . . . .	586	natans . . . . .	648
Solandri . . . . .	128	Forstera . . . . .	166	Phyllanthus . . . . .	649
Eurybiopsis australis . . . . .	136	Bidwillii . . . . .	167	pyriferus . . . . .	655
? Eutaxia Strangeana . . . . .	53	sedifolia . . . . .	166	radiatus . . . . .	656
Exarrhena . . . . .	195	tenella . . . . .	167	retroflexus . . . . .	651
Lyallii . . . . .	196	Fossombronina . . . . .	539, 752, 755	stiriatum . . . . .	700
macrantha . . . . .	195, 738	intestinalis . . . . .	539	thyrsoides . . . . .	676
petiolata . . . . .	195	pusilla . . . . .	539	torulosus . . . . .	651
saxosa . . . . .	196	Freycinetia . . . . .	275	turbinatus . . . . .	649

	Page		Page		Page
<i>viridis</i> . . . . .	655	Gesneriaceæ . . . . .	221	<i>tetragyna</i> . . . . .	65
<i>Fuirena rubiginosa</i> . . . . .	304	Geum . . . . .	55	<i>Goodenia repens</i> . . . . .	173
Funaria . . . . .	449	<i>magellanicum</i> . . . . .	55	Gottschea . . . . .	512, 751
cuspidata . . . . .	450	parviflorum . . . . .	55, 727	appendiculata . . . . .	513
glabra . . . . .	450	urbanum, var. strictum . . . . .	55	Balfouriana . . . . .	512
hygrometrica . . . . .	450	<i>Gibbera Saubinetii</i> . . . . .	634	ciliata . . . . .	513
Fungi . . . . .	595	Gigartina . . . . .	698	<i>ciliigera</i> . . . . .	514
Gahnia . . . . .	305	alveata . . . . .	699	<i>diplophylla</i> . . . . .	519
arenaria . . . . .	306	ancistroclada . . . . .	699	glaucescens . . . . .	512
lacera . . . . .	306	Chapmani . . . . .	699	<i>Hombrowiana</i> . . . . .	512
procera . . . . .	306	Chauvini . . . . .	699	Lehmanniana . . . . .	512
scitifolia . . . . .	306	decipiens . . . . .	700	nobilis . . . . .	513
xanthocarpa . . . . .	366	<i>divaricata</i> . . . . .	699	<i>pachyphylla</i> . . . . .	514
Gaimardia . . . . .	295	livida . . . . .	699	pinnatifolia . . . . .	514
ciliata . . . . .	295	pistillata . . . . .	699	repleta . . . . .	513
setacea . . . . .	295	Radula . . . . .	700	splachnophylla . . . . .	513
? <i>pallida</i> . . . . .	296	stiriata . . . . .	700	tuloides . . . . .	514
Galium . . . . .	120	<i>Ginnania furcellata</i> . . . . .	691	unguicularis . . . . .	513
<i>propinquum</i> . . . . .	121	Gleichenia . . . . .	347	Gracilaria . . . . .	687
tenuicaule . . . . .	120	<i>alpina</i> . . . . .	348	confervoides . . . . .	687
umbrosum . . . . .	121	circinata . . . . .	347	coriacea . . . . .	687
Gastrodia . . . . .	263	Cunninghamii . . . . .	348	<i>furcata</i> . . . . .	697
Cunninghamii . . . . .	263	dicarpa . . . . .	348, 747	multipartita . . . . .	687
<i>sesamoides</i> . . . . .	264	dichotoma . . . . .	747	<i>torulosa</i> . . . . .	697
Gaultheria . . . . .	174	flabellata . . . . .	348	Gramineæ . . . . .	317
antipoda . . . . .	174	<i>hecistophylla</i> . . . . .	348	<i>Grammitis australis</i> . . . . .	380
fagifolia . . . . .	175	<i>microphylla</i> . . . . .	348	<i>Billardieri</i> . . . . .	380
oppositifolia . . . . .	175	<i>semivestita</i> . . . . .	347	<i>ciliata</i> . . . . .	380
rupestris . . . . .	175	Glossostigma . . . . .	203	<i>heterophylla</i> . . . . .	380
Geaster . . . . .	617	elatinoides . . . . .	203	<i>humilis</i> . . . . .	380
fimbriatus . . . . .	617	Glyceria . . . . .	336	<i>novæ-Zelandiæ</i> . . . . .	383
Gelidium . . . . .	688	stricta . . . . .	336	<i>rigida</i> . . . . .	380
asperum . . . . .	688	Gnaphalium . . . . .	151	<i>scolopendrina</i> . . . . .	383
corneum . . . . .	688	bellidioides . . . . .	152	Graphis . . . . .	585
Geniostoma . . . . .	189	Colensoi . . . . .	154	anguina . . . . .	586
ligustrifolium . . . . .	189	collinum . . . . .	155	confinis . . . . .	586
Gentiana . . . . .	189	<i>Cunninghamii</i> . . . . .	155	elegans . . . . .	586
cerina . . . . .	191	<i>dealbatum</i> . . . . .	153	inquinata . . . . .	586
concluna . . . . .	190	flicaula . . . . .	153	insidiosa . . . . .	586
<i>Grisebachii</i> . . . . .	190	grandiceps . . . . .	154	sculpturata . . . . .	586
montana . . . . .	190	involutratum . . . . .	155	scripta . . . . .	586
pleurogynoides . . . . .	190, 737	Kerense . . . . .	153	Grateloupia . . . . .	704
saxosa . . . . .	190	lanatum . . . . .	155	? <i>Aucklandica</i> . . . . .	704
Gentianeæ . . . . .	189	luteo-album . . . . .	154	Gratiola . . . . .	203
Geoglossum . . . . .	627	Lyallii . . . . .	152	nana . . . . .	203
hirsutum . . . . .	627	nitidulum . . . . .	154	sexdentata . . . . .	203
Geraniaceæ . . . . .	35	prostratum . . . . .	152	Griffithsia . . . . .	709
Geranium . . . . .	35	simplex . . . . .	155	antarctica . . . . .	709
<i>brevicaule</i> . . . . .	36	Sinclairii . . . . .	153	setacea . . . . .	709
dissectum var. . . . .	36	Traversii . . . . .	154	Grimmia . . . . .	424
carolinianum . . . . .	36	trinerve . . . . .	153	apocarpa . . . . .	424
microphyllum . . . . .	36	<i>virgatum</i> . . . . .	155	basaltica . . . . .	425
molle . . . . .	37	Youngii . . . . .	152	<i>cygnicolla</i> . . . . .	425
<i>potentilloides</i> . . . . .	36	<i>Goniocarpus citriodorus</i> . . . . .	66	pulvinata . . . . .	424
sessiliflorum . . . . .	36	<i>depressus</i> . . . . .	65	trichophylla . . . . .	425
Traversii . . . . .	726	<i>scaber</i> . . . . .	65	Griselinia . . . . .	104
		<i>tenellus</i> . . . . .	66	littoralis . . . . .	105



	Page		Page		Page
lucida . . . . .	105	alata . . . . .	65	Hoheria . . . . .	31
Guepinia . . . . .	614	depressa . . . . .	65	<i>Iyallii</i> . . . . .	30
pezizæformis . . . . .	614	micrantha . . . . .	66	populnea . . . . .	31, 726
spathularia . . . . .	614	tetragnya . . . . .	65	Sinclairii . . . . .	31
Guilandina Bonduc . . . . .	53	Halymenia . . . . .	703	Holcus mollis . . . . .	333
Gunnera . . . . .	67	latissima . . . . .	703	Holomitrium perichæ-	
densiflora . . . . .	68	membranacea . . . . .	694	tiale . . . . .	405
monoica . . . . .	67	novæ-Zelandiæ . . . . .	703	Hookeria . . . . .	492
prorepens . . . . .	68	Urvilleana . . . . .	703	adnata . . . . .	494
<i>Gyalecta cupularis</i> . . . . .	581	<i>Hamelinia veratroides</i> . . . . .	285	amblyophylla . . . . .	494
Gymnanthe . . . . .	519	<i>Hartighsea spectabilis</i> . . . . .	41	apiculata . . . . .	493
diplophylla . . . . .	519, 754	<i>Haxtonia furfuracea</i> . . . . .	125	crispula . . . . .	493
Drummondii . . . . .	519, 754	Hectorella . . . . .	27	cristata . . . . .	496
lophocoleoides . . . . .	519, 753,	cæspitosa . . . . .	27	denticulata . . . . .	495
754		Hedwigia . . . . .	423	flexicollis . . . . .	496
saccata . . . . .	520, 753, 754	ciliata . . . . .	423	flexuosa . . . . .	494
setulosa . . . . .	519, 753, 754	<i>Humboldtii</i> . . . . .	423	microcarpa . . . . .	495
tenella . . . . .	520	Hedycarya . . . . .	240	nigella . . . . .	496
unguiculata . . . . .	519	dentata . . . . .	240, 739	pulchella . . . . .	494
Urvilleana . . . . .	520, 754	<i>Hekaterosachne elatior</i> . . . . .	323	punctata . . . . .	483
<i>Gymnococca arenaria</i> . . . . .	244	<i>Helichrysum Colensoi</i> . . . . .	154	quadrifaria . . . . .	495
<i>micr carp a</i> . . . . .	244	<i>filic arle</i> . . . . .	153	robusta . . . . .	495
Gymnogongrus . . . . .	696	<i>grandiceps</i> . . . . .	154	<i>rotulata</i> . . . . .	488
furcellatus . . . . .	697	<i>micranthum</i> . . . . .	153	rotundifolia . . . . .	493
vernicularis . . . . .	697	<i>Sinclairii</i> . . . . .	153	sinuosa . . . . .	494
Gymnogramme . . . . .	382	<i>Youngii</i> . . . . .	152	tenella . . . . .	493
involuta . . . . .	383	Helophyllum . . . . .	167	Hormosira . . . . .	652
leptophylla . . . . .	383, 749	clavigerum . . . . .	167	Billardieri . . . . .	653
rutæfolia . . . . .	383	Colensoi . . . . .	168	<i>Billardieri</i> . . . . .	653
Gymnomitrium . . . . .	501, 751	rubrum . . . . .	168	<i>obconica</i> . . . . .	653
acinacifolium . . . . .	501	<i>Helvella pannosa</i> . . . . .	612	<i>Sieberi</i> . . . . .	653
concinatum . . . . .	501	Hemineura . . . . .	683	Hydnum . . . . .	611
<i>minutum</i> . . . . .	501	cruenta . . . . .	683	clathroides . . . . .	611
ochrophyllum . . . . .	501	Hendersouia . . . . .	622	scopinellum . . . . .	611
stygium . . . . .	501	hyalospora . . . . .	622	Sinclairii . . . . .	756
Gymnosporium . . . . .	624	microsticta . . . . .	622	Hydrocotyle . . . . .	85
culmigenum . . . . .	624	Hepaticæ . . . . .	497	americana . . . . .	85
Gymnostichum . . . . .	343	<i>Hermanthalia gladiata</i> . . . . .	652	asiatica . . . . .	86
gracile . . . . .	343	<i>Herpetium decrescens</i> . . . . .	525	<i>cordifolia</i> . . . . .	86
Gymnostomum . . . . .	403	involutum . . . . .	525	dissecta . . . . .	86
<i>æstivum</i> . . . . .	456	Herpolirion . . . . .	287	elongata . . . . .	85
calcareum . . . . .	403	novæ-Zelandiæ . . . . .	237	heteromeria . . . . .	86, 729
<i>gracile</i> . . . . .	435	<i>Heterosiphonia Berke-</i>		microphylla . . . . .	87
<i>inclinans</i> . . . . .	435	<i>leyi</i> . . . . .	673	moschata . . . . .	87
<i>linearifolium</i> . . . . .	434	Hibiscus . . . . .	31, 726	muscosa . . . . .	86
tortile . . . . .	403	Trionum . . . . .	31	novæ-Zelandiæ . . . . .	86
<i>Gynerium (?) Zelandi-</i>		<i>vesicarius</i> . . . . .	32	pterocarpa . . . . .	86
<i>cum</i> . . . . .	331	Hierochloe . . . . .	321	<i>tripartita</i> . . . . .	86
Gypsophila . . . . .	22	alpina . . . . .	322	Hygrophorus . . . . .	604
tubulosa . . . . .	22, 725	<i>antarctica</i> . . . . .	321	cyaneus . . . . .	604
		<i>borealis</i> . . . . .	322	<i>Hygropila dilatata</i> . . . . .	546
Haastia . . . . .	155, 733	Brunonis . . . . .	322	Hymenanthera . . . . .	18
pulvinaris . . . . .	156	redolens . . . . .	321, 746	<i>crassifolia</i> . . . . .	18, 724
recurva . . . . .	156	Hirneola . . . . .	615	Hymenodon . . . . .	485
Sinclairii . . . . .	156, 734	auricula-Judæ . . . . .	615	piliferus . . . . .	486
Halorageæ . . . . .	64	hispidula . . . . .	615	Hymenophyllum . . . . .	352
Haloragis . . . . .	64	polytricha . . . . .	615	æruginosum . . . . .	355, 747

	Page		Page		Page
<i>atro-virens</i> . . . . .	354	<i>cochlearifolium</i> . . . . .	480	<i>politum</i> . . . . .	482
<i>bivalve</i> . . . . .	353	<i>collatum</i> . . . . .	478	<i>polygamum</i> . . . . .	479
<i>ciliatum</i> . . . . .	747	<i>comosum</i> . . . . .	466	<i>polystictum</i> . . . . .	482
<i>crispatum</i> . . . . .	354, 747	<i>confertum</i> . . . . .	478	<i>pubescens</i> . . . . .	475
<i>cupressiforme</i> . . . . .	353	<i>consimile</i> . . . . .	449	<i>pulchellum</i> . . . . .	476
<i>demissum</i> . . . . .	354	<i>contiguum</i> . . . . .	474	<i>relaxum</i> . . . . .	479
<i>dilatatum</i> . . . . .	354, 747	<i>crassiusculum</i> . . . . .	474	<i>remotifolium</i> . . . . .	477
<i>flabellatum</i> . . . . .	355, 747	<i>crinitum</i> . . . . .	481	<i>riparum</i> . . . . .	482
<i>flabellatum</i> . . . . .	354	<i>cupressiforme</i> . . . . .	476	<i>rutabulum</i> . . . . .	478
<i>flexuosum</i> . . . . .	354	<i>cupressiformae</i> . . . . .	475	<i>Sandwichense</i> . . . . .	477
<i>Franklinianum</i> . . . . .	355	<i>decussatum</i> . . . . .	480	<i>scabrifolium</i> . . . . .	448
<i>fumarioides</i> . . . . .	353	<i>densifolium</i> . . . . .	480	<i>serpens</i> . . . . .	479
<i>Hookeri</i> . . . . .	355	<i>denticulatum</i> . . . . .	482	<i>setigerum</i> . . . . .	488
<i>imbricatum</i> . . . . .	353	<i>denticulosum</i> . . . . .	472	<i>Sieberi</i> . . . . .	466
<i>Lyallii</i> . . . . .	355, 747	<i>distichum</i> . . . . .	484	<i>sparsum</i> . . . . .	471
<i>minimum</i> . . . . .	353	<i>divulsum</i> . . . . .	481	<i>spiniforme</i> . . . . .	485
<i>multifidum</i> . . . . .	353	<i>Donianum</i> . . . . .	482	<i>spiniervium</i> . . . . .	466
<i>nitens</i> . . . . .	355	<i>Drummondii</i> . . . . .	475	<i>subbasilare</i> . . . . .	485
<i>novo-Zelandicum</i> . . . . .	353	<i>elongatum</i> . . . . .	449	<i>tenuifolium</i> . . . . .	478
<i>polyanthos</i> . . . . .	354, 747	<i>elusum</i> . . . . .	478	<i>tenuirostre</i> . . . . .	474
<i>pulcherrimum</i> . . . . .	354	<i>extenuatum</i> . . . . .	481	<i>terræ-Novæ</i> . . . . .	476
<i>rarum</i> . . . . .	353	<i>falcifolium</i> . . . . .	483	<i>umbrosum</i> . . . . .	473
<i>revolutum</i> . . . . .	353	<i>filicinum</i> . . . . .	472	<i>uncinatum</i> . . . . .	472
<i>sanguinolentum</i> . . . . .	354	<i>filiculeforme</i> . . . . .	487	<i>ungiculatum</i> . . . . .	471
<i>scabrum</i> . . . . .	355	<i>flexile</i> . . . . .	480	<i>vagum</i> . . . . .	481
<i>semi-bivalve</i> . . . . .	353	<i>fluitans</i> . . . . .	472	<i>Hypocrea</i> . . . . .	631
<i>spathulatum</i> . . . . .	353	<i>fulvastrum</i> . . . . .	471	<i>gelatinosa</i> . . . . .	631
<i>tunbridgense</i> . . . . .	352	<i>furfurosum</i> . . . . .	471	<i>Hypolepis</i> . . . . .	361
<i>unilaterale</i> . . . . .	353	<i>glauco-viride</i> . . . . .	473	<i>distans</i> . . . . .	362, 748
<i>villosum</i> . . . . .	354	<i>gracile</i> . . . . .	465	<i>Millefolium</i> . . . . .	361
<i>Wilsoni</i> . . . . .	353	<i>gracilescens</i> . . . . .	465	<i>tenuifolia</i> . . . . .	361
<i>Hymenostomum tortile</i> . . . . .	403	<i>hastatum</i> . . . . .	471	<i>Hypopterygium</i> . . . . .	486
<i>Hypericinæ</i> . . . . .	28	<i>bispidium</i> . . . . .	473	<i>ciliatum</i> . . . . .	489
<i>Hypericum</i> . . . . .	28	<i>homomallum</i> . . . . .	474	<i>concinnum</i> . . . . .	489
<i>gramineum</i> . . . . .	29, 725	<i>inflatum</i> . . . . .	481	<i>discolor</i> . . . . .	488
<i>japonicum</i> . . . . .	29	<i>Joliffii</i> . . . . .	474	<i>filiculeforme</i> . . . . .	487
<i>pusillum</i> . . . . .	29	<i>Kneiffii</i> . . . . .	472	<i>glaucum</i> . . . . .	488
<i>Hypnea</i> . . . . .	689	<i>læviusculum</i> . . . . .	471	<i>novæ-Zelandiæ</i> . . . . .	487
<i>? multicornis</i> . . . . .	689	<i>leptorhynchum</i> . . . . .	475	<i>occanicum</i> . . . . .	487
<i>musceiformis</i> . . . . .	689	<i>leptorhynchum</i> , $\beta$ . . . . .	474	<i>rotulatum</i> . . . . .	488
<i>Hypnum</i> . . . . .	467	<i>leucocythus</i> . . . . .	475	<i>rotulatum</i> . . . . .	487
<i>aciculare</i> . . . . .	480	<i>limetum</i> . . . . .	476	<i>setigerum</i> . . . . .	488
<i>acinacifolium</i> . . . . .	477	<i>limbatum</i> . . . . .	473	<i>Smithianum</i> . . . . .	487, 488
<i>acutifolium</i> . . . . .	476	<i>limbatum</i> . . . . .	466	<i>Struthiopteris</i> . . . . .	489
<i>amœnum</i> . . . . .	474	<i>Menziesii</i> . . . . .	466	<i>tanariscium</i> . . . . .	488
<i>Arbuscula</i> . . . . .	465	<i>microcarpum</i> . . . . .	495	<i>viridulum</i> . . . . .	487
<i>aristatum</i> . . . . .	478	<i>mnioides</i> . . . . .	485	<i>Hypoxidæ</i> . . . . .	274
<i>aristatum</i> . . . . .	473	<i>molliculum</i> . . . . .	475	<i>Hypoxis</i> . . . . .	275
<i>asperipes</i> . . . . .	477	<i>Mosmanianum</i> . . . . .	476	<i>hygrometrica</i> . . . . .	275
<i>auriculatum</i> . . . . .	481	<i>Mougeotianum</i> . . . . .	486	<i>pusilla</i> . . . . .	275
<i>austrianum</i> . . . . .	477	<i>mundulum</i> . . . . .	476	<i>Hypoxylon</i> . . . . .	632
<i>bifarium</i> . . . . .	485	<i>muriculatum</i> . . . . .	477	<i>annulatum</i> . . . . .	632
<i>brachiatum</i> . . . . .	472	<i>nitidulum</i> . . . . .	476	<i>Colensoi</i> . . . . .	756
<i>cerviculatum</i> . . . . .	473	<i>nodiflorum</i> . . . . .	479	<i>concentricum</i> . . . . .	632
<i>chlamydophyllum</i> . . . . .	481	<i>patale</i> . . . . .	475	<i>Hystericina alopecuroi-</i> <i>des</i> . . . . .	325
<i>chrysogaster</i> . . . . .	475	<i>paradoxum</i> . . . . .	479	<i>Hysterium</i> . . . . .	629
<i>clandestinum</i> . . . . .	480	<i>plumosum</i> . . . . .	479		

	Page		Page		Page
breye . . . . .	630	brexioides . . . . .	59	Harveyana . . . . .	698
Ileodietyon . . . . .	616	Jania . . . . .	680	<i>Kampmannia</i> <i>Zelandiæ</i>	343
cibarium . . . . .	616	Cuvieri . . . . .	680	Knightia . . . . .	241
gracile . . . . .	616	Hombrouii . . . . .	680	excelsa . . . . .	241
Iponœa . . . . .	198	micrarthrodia . . . . .	680	Kœleria . . . . .	334
Batatas . . . . .	760	novæ-Zelandiæ . . . . .	681	cristata . . . . .	334
chrysorhiza . . . . .	763	pistillaris . . . . .	680	Labiatae . . . . .	225
pendula . . . . .	199	tenuissima . . . . .	681	<i>Lachnagrostis æmula</i>	329
tuberculata . . . . .	199	Jasmineæ . . . . .	186	<i>Billardieri</i>	329
Iridæa . . . . .	700	Juncæe . . . . .	288	<i>Forsteri</i>	329
decipiens . . . . .	700	Juncus . . . . .	288	Lagenophora . . . . .	136
laminarioides . . . . .	701	antarcticus . . . . .	290	Forsteri . . . . .	137
lanccolata . . . . .	701	australis . . . . .	289	lanata . . . . .	137
lusoria . . . . .	701	bufonius . . . . .	290	petiolata . . . . .	137
micans . . . . .	700	capillaceus . . . . .	291	pinnatifida . . . . .	137
<i>Radula</i> . . . . .	700	cephalotes . . . . .	290	<i>Laminaria flabelliformis</i>	656
stiriata . . . . .	700	communis . . . . .	290	<i>Lampocarya affinis</i>	306
volans . . . . .	701	effusus . . . . .	290	lacera . . . . .	306
volans . . . . .	700	Holoschœnus . . . . .	290	setifolia . . . . .	306
Irideæ . . . . .	273	maritimus . . . . .	289	tenax . . . . .	304
Irpex . . . . .	611	novæ-Zelandiæ . . . . .	291, 745	xanthocarpa . . . . .	306
brevis . . . . .	611	planifolius . . . . .	290, 745	Landsburgia . . . . .	652
Isachne . . . . .	324	plebejus . . . . .	290	quercifolia . . . . .	652
australis . . . . .	324	scheuzerioides . . . . .	291	<i>Lastrea velutina</i>	378
Isolepis . . . . .	301	vaginatus . . . . .	289, 745	<i>Laurelia novæ-Zelandiæ</i>	240
aucklandica . . . . .	302	Jungermannia . . . . .	502, 751	Laurencia . . . . .	675
basilaris . . . . .	302	abbreviata . . . . .	520	botrychioides . . . . .	675
cartilaginea . . . . .	302	eolorata . . . . .	502	botryoides . . . . .	676
nodosa . . . . .	301	concinata . . . . .	501	cæspitosa . . . . .	676
prolifer . . . . .	301	cymbalifera . . . . .	518	distichophylla?	676
riparia . . . . .	302	dentata . . . . .	503, 753	elata . . . . .	675
setacea . . . . .	302	diplophylla . . . . .	519	Forsteri . . . . .	676
setosa . . . . .	302	ericaula . . . . .	544	gracilis . . . . .	676
spiralis . . . . .	303	falcata . . . . .	518	papillosa . . . . .	676
Isotachis . . . . .	526, 751, 754	flabellata . . . . .	542	pinnatifida . . . . .	675
intortifolia . . . . .	526	flexicaulis . . . . .	502	virgata . . . . .	676
Lyallii . . . . .	526	hirsuta . . . . .	528	Laurineæ . . . . .	238
subtrifida . . . . .	526	<i>Hymenophyllum</i>	542	<i>Laurus calicaris</i>	238
Isothecium . . . . .	463	inundata . . . . .	502, 753	Tarairi . . . . .	239
angustatum . . . . .	465	monodon . . . . .	502	Tawa . . . . .	239
Arbuscula . . . . .	465	multicuspadata . . . . .	503	Victoriana . . . . .	239
<i>Colensoi</i> . . . . .	467	perigonalis . . . . .	502	Leathesia . . . . .	660
comatum . . . . .	467	<i>Phyllanthus</i> . . . . .	541	Berkeleyi . . . . .	660
comosum . . . . .	466	porphyrorhiza . . . . .	539	<i>Lecanactis impolita</i>	589
gracile . . . . .	465	pulchella . . . . .	504, 753	Lecanora . . . . .	577
Kerrii . . . . .	466	punicea . . . . .	503	argopholis . . . . .	579
marginatum . . . . .	466	quadrifida . . . . .	504, 753	atra . . . . .	579
Menziesii . . . . .	465	rhizobola . . . . .	542	aurantiaca . . . . .	578
pandum . . . . .	464	rotata . . . . .	503, 753	cerina . . . . .	577
pulvinatum . . . . .	465	schismoides . . . . .	503	chyrosticta . . . . .	578
ramulosum . . . . .	465	squarrosa . . . . .	503, 753	cinerea . . . . .	578
Sieberi . . . . .	466	<i>strongylophylla</i>	508	erigua . . . . .	578
spininervium . . . . .	466	turgescens . . . . .	508	ferruginea . . . . .	578
sulcatum . . . . .	464	Jungermanniæ . . . . .	lxvii	glaucoma . . . . .	579
<i>Icalum inerme</i>	322	Kallymenia . . . . .	698	homologa . . . . .	580
Ixerba . . . . .	59			parella . . . . .	578

	Page		Page		Page
parellina . . . . .	579	petræa . . . . .	585	oleraceum . . . . .	14
peloleuca . . . . .	580	<i>petræa</i> . . . . .	584	sisymbrioides . . . . .	14
pnicea . . . . .	579	<i>platycarpa</i> . . . . .	584	Lepidosperma . . . . .	307
pyracea . . . . .	579	pulverea . . . . .	585	<i>australis</i> . . . . .	307
simplex . . . . .	580	pyrophthalmia . . . . .	582	<i>concava</i> . . . . .	307
sophodes . . . . .	578	rosella . . . . .	583	<i>elatior</i> . . . . .	307
subfusca . . . . .	579	sabuletorum . . . . .	585	<i>longitudinalis</i> . . . . .	307
tartarea . . . . .	578	stellulata . . . . .	585	<i>striata</i> . . . . .	305
thiomela . . . . .	580	subsimilis . . . . .	585	teträgona . . . . .	307, 746
umbrina . . . . .	579	trachona . . . . .	585	Lepidozia . . . . .	520, 751
varia . . . . .	579	tuberculosa . . . . .	583, 585	<i>albula</i> . . . . .	523, 754
verrucosa . . . . .	579	vernalis . . . . .	582	capillaris . . . . .	522
vitellina . . . . .	578	vesicularis . . . . .	584	capilligera . . . . .	521, 754
Lecidea . . . . .	581	Leguminosæ . . . . .	47	dispar . . . . .	522
abietina . . . . .	584	Leioscyphus . . . . .	507, 750	filamentosa . . . . .	522
<i>albido-plumbea</i> . . . . .	584	chiloscyphoides . . . . .	508	Gottscheana . . . . .	521
allotropia . . . . .	585	repens . . . . .	508	<i>hippuroides</i> . . . . .	523
amphitropa . . . . .	585	strongylophylla . . . . .	508	<i>lævifolia</i> . . . . .	521
arcutina . . . . .	585	turgesceus . . . . .	508	Lindenbergii . . . . .	522
atro-alba . . . . .	584	<i>Leiospermum racemosum</i> . . . . .	61	microphylla . . . . .	521
carneola . . . . .	581	Lejeunia . . . . .	531, 752, 755	<i>nemoides</i> . . . . .	523
ceroplasta . . . . .	583	<i>albo-virens</i> . . . . .	533	patentissima . . . . .	522
cinabarinia . . . . .	582	anguliformis . . . . .	532	pendulina . . . . .	521
citrinella . . . . .	585	comitans . . . . .	534	plumulosa . . . . .	523
coarctata . . . . .	582	cucullata . . . . .	533	prænitens . . . . .	521
Colensoi . . . . .	584	<i>dentata</i> . . . . .	531	spinosissima . . . . .	522
contigua . . . . .	584	<i>implexicaulis</i> . . . . .	533	tenax . . . . .	523
cupularis . . . . .	581	<i>lævigata</i> . . . . .	532	<i>tetradactyla</i> . . . . .	523
Curreyi . . . . .	585	latitans . . . . .	534	Leptangium . . . . .	423
dccolorans . . . . .	582	<i>Mimosa</i> . . . . .	533	repens . . . . .	424
decipiens . . . . .	583	nudipes . . . . .	534	<i>Leptinella dioica</i> . . . . .	143
disciformis . . . . .	585	olivacea . . . . .	532	<i>lanata</i> . . . . .	141
Domingensis . . . . .	583	papillata . . . . .	533	<i>minor</i> . . . . .	142
flavido-atra . . . . .	585	<i>plicatiloba</i> . . . . .	533	<i>plumosa</i> . . . . .	141
flavo-pallesceus . . . . .	582	<i>primordialis</i> . . . . .	533	<i>pusilla</i> . . . . .	143
<i>flavo-viresceus</i> . . . . .	585	pulchella . . . . .	532	<i>squalida</i> . . . . .	143
furfuracea . . . . .	585	rufesceus . . . . .	533	<i>Leptobryum pyriforme</i> . . . . .	438
fusco-atra . . . . .	585	scutellata . . . . .	532	Leptocarpus . . . . .	294
geographica . . . . .	585	Stephensoniana . . . . .	533	<i>simplex</i> . . . . .	294
<i>geomæa</i> . . . . .	584	thymifolia . . . . .	534	<i>Leptocionium sororium</i> . . . . .	354
grossa . . . . .	585	tumida . . . . .	534	Leptodon . . . . .	458
<i>incana</i> . . . . .	584	Lembidium . . . . .	751, 754	Smithii . . . . .	458
intermixta . . . . .	582	Lemna . . . . .	277	Leptopteris . . . . .	384
lapidica . . . . .	584	gibba . . . . .	278	hymenophylloides . . . . .	384
lenticularis . . . . .	585	minor . . . . .	278, 742	superba . . . . .	384
leucothalamia . . . . .	585	Lenormandia . . . . .	662	Leptogium . . . . .	557
mamillaris . . . . .	583	Chauvinii . . . . .	662	<i>Brebbissonii</i> . . . . .	558
marguiflexa . . . . .	583	Lenticulariæ . . . . .	222	bullatum . . . . .	558
melanotropia . . . . .	585	Lentinus . . . . .	605	chloromelum . . . . .	558
millegrana . . . . .	585	<i>novæ-Zelandiæ</i> . . . . .	605	<i>rugatum</i> . . . . .	558
myriocarpa . . . . .	585	Lenzites . . . . .	606	saturninum . . . . .	558
Otagensis . . . . .	585	repanda . . . . .	606	scoticum . . . . .	558
oxyspora . . . . .	585	Leotia . . . . .	627	tremelloides . . . . .	558
pachycarpa . . . . .	585	lubrica . . . . .	627	Leptospermum . . . . .	69
<i>papillata</i> . . . . .	584	Leperoma . . . . .	751, 754	ericoides . . . . .	70, 728
parasema . . . . .	584	Lepidium . . . . .	13	scoparium . . . . .	69
parvifolia . . . . .	582	incisum . . . . .	14	<i>scandens</i> . . . . .	71



	Page		Page		Page
<i>perforatum</i> . . .	73	<i>aromaticum</i> . . .	96, 730	<i>heterophylla</i> . . .	367
<i>Leptostomum</i> . . .	435	<i>brevistyle</i> . . .	95	<i>lanceolata</i> . . .	367
<i>flexipile</i> . . .	435	<i>carnosulum</i> . . .	96, 730	<i>lanceolata</i> . . .	368
<i>gracile</i> . . .	435	<i>Dieffenbachii</i> . . .	729	<i>latifolia</i> . . .	366
<i>inclinans</i> . . .	435	<i>filifolium</i> . . .	95, 730	<i>linearis</i> . . .	368
<i>macrocarpum</i> . . .	436	<i>Haastii</i> . . .	95, 730	<i>membranacea</i> . . .	366
<i>Leptostroma</i> . . .	622	<i>imbricatum</i> . . .	97, 730	<i>nigra</i> . . .	369
<i>litigiosum</i> . . .	622	<i>intermedium</i> . . .	94	<i>pimpinellifolia</i> . . .	366
<i>Leptotheca Gaudichaudii</i>	436	<i>latifolium</i> . . .	94	<i>procera</i> . . .	366, 748
<i>Leptotrichum affine</i> . . .	417	<i>Lyallii</i> . . .	95, 729	<i>propinqua</i> . . .	366
<i>australe</i> . . .	417	<i>piliferum</i> . . .	96, 730	<i>pumila</i> . . .	367, 748
<i>concinnum</i> . . .	489	<i>trifoliolatum</i> . . .	97	<i>rotundifolia</i> . . .	366
<i>cristatum</i> . . .	496	<i>Liliaceæ</i> . . .	280	<i>vulcanica</i> . . .	367
<i>Leskea ericoides</i> . . .	458	<i>Limosella</i> . . .	204	<i>Lomentaria affinis</i> . . .	675
<i>fulvastrata</i> . . .	471	<i>aquatica</i> . . .	204	<i>novæ-Zelandiæ</i> . . .	674
<i>hispida</i> . . .	473	<i>australis</i> . . .	204	<i>parvula</i> . . .	675
<i>homomalla</i> . . .	475	<i>tenuifolia</i> . . .	204	<i>Lonchitis tenuifolia</i> . . .	361
<i>mollis</i> . . .	459	<i>Lindsæa</i> . . .	359	<i>Lophocolea</i> . . .	508, 750, 753
<i>novæ-Hollandiæ</i> . . .	485	<i>Lessoni</i> . . .	359	<i>allodonta</i> . . .	511
<i>rotulata</i> . . .	488	<i>linearis</i> . . .	359, 748	<i>alternifolia</i> . . .	510
<i>sulcata</i> . . .	464	<i>trichomanoides</i> . . .	359	<i>australis</i> . . .	510
<i>tamariscina</i> . . .	488	<i>trichomanoides</i> . . .	359	<i>biciliata</i> . . .	509
<i>umbrosa</i> . . .	473	<i>viridis</i> . . .	359	<i>bidentata</i> . . .	510
<i>Lessonia</i> . . .	656	<i>Lineæ</i> . . .	34	<i>bispinosa</i> . . .	510
<i>fuscescens</i> . . .	656	<i>Linum</i> . . .	34	<i>chlorophylla</i> . . .	517
<i>Lethocolea</i> . . .	751, 753	<i>monogynum</i> . . .	35, 726	<i>Colensoi</i> . . .	509, 753
<i>Leucobryum</i> . . .	409	<i>Lithobia calcarea</i> . . .	681	<i>connata</i> . . .	509
<i>brachyphyllum</i> . . .	409	<i>Lobelia</i> . . .	171	<i>diademata</i> . . .	511
<i>candidum</i> . . .	409	<i>anceps</i> . . .	171, 735	<i>divaricata</i> . . .	510
<i>Leucodon</i> . . .	457	<i>angulata</i> . . .	172	<i>echinellus</i> . . .	517
<i>calycinus</i> . . .	409	<i>littoralis</i> . . .	172	<i>heterophylloides</i> . . .	509
<i>hexastichus</i> . . .	457	<i>perpusilla</i> . . .	172	<i>lenta</i> . . .	511
<i>implexus</i> . . .	457	<i>physaloides</i> . . .	171	<i>leptantha</i> . . .	510
<i>Kunzeanus</i> . . .	457	<i>Roughii</i> . . .	171	<i>leucophylla</i> . . .	509
<i>Lagurus</i> . . .	457	<i>rugulosa</i> . . .	735	<i>multipectinata</i> . . .	509
<i>nitidus</i> . . .	457	<i>submersa</i> . . .	203	<i>muricata</i> . . .	511
<i>pallidus</i> . . .	410	<i>Loganiaceæ</i> . . .	188	<i>novæ-Zelandiæ</i> . . .	510
<i>Leucoloma incanum</i> . . .	410	<i>Logania</i> . . .	188	<i>pallida</i> . . .	508
<i>Leucopogon</i> . . .	177	<i>ciliolata</i> . . .	737	<i>perpusilla</i> . . .	511
<i>Bellignianus</i> . . .	178	<i>depressa</i> . . .	188	<i>planiuscula</i> . . .	510
<i>Colensoi</i> . . .	177	<i>tetragona</i> . . .	188, 737	<i>polyclada</i> . . .	516
<i>fasciculatus</i> . . .	177	<i>Lolium arvense</i> . . .	343	<i>recurvifolia</i> . . .	510
<i>Frazeri</i> . . .	178	<i>perenne</i> . . .	343	<i>rivalis</i> . . .	510
<i>nesophilus</i> . . .	178	<i>temulentum</i> . . .	343	<i>sabuletorum</i> . . .	510
<i>Richei</i> . . .	735	<i>Lomaria</i> . . .	365	<i>secundifolia</i> . . .	511
<i>Libocedrus</i> . . .	256	<i>alpina</i> . . .	368	<i>spinifera</i> . . .	511
<i>Bidwillii</i> . . .	257	<i>attenuata</i> . . .	368	<i>subintegra</i> . . .	510
<i>Doniana</i> . . .	256	<i>Banksii</i> . . .	368	<i>subporosa</i> . . .	509
<i>Libertia</i> . . .	274	<i>Colensoi</i> . . .	367	<i>subviridis</i> . . .	510
<i>grandiflora</i> . . .	274	<i>deflexa</i> . . .	367	<i>textilis</i> . . .	510
<i>ixioides</i> . . .	274, 741	<i>deltoidea</i> . . .	367	<i>triacantha</i> . . .	509
<i>micrantha</i> . . .	274	<i>discolor</i> . . .	368, 748	<i>Lophiodon longifolius</i> . . .	418
<i>Lichenes</i> . . .	550	<i>dura</i> . . .	748	<i>Lopidium concinnum</i> . . .	489
<i>Lichina</i> . . .	556	<i>elongata</i> . . .	367	<i>pallens</i> . . .	489
<i>pygmæa</i> . . .	556	<i>filiformis</i> . . .	366	<i>Loranthaceæ</i> . . .	106
<i>Ligusticum</i> . . .	93	<i>Frazeri</i> . . .	369	<i>Loranthus</i> . . .	106
<i>antipodum</i> . . .	94	<i>fluviatilis</i> . . .	366	<i>Colensoi</i> . . .	107

	Page		Page		Page
<i>flavidus</i> . . . . .	107	<i>barbatum</i> . . . . .	431	<i>decrescens</i> . . . . .	525
<i>mieranthus</i> . . . . .	107	<i>erosulum</i> . . . . .	431	<i>involutum</i> . . . . .	525
<i>tenuiflorus</i> . . . . .	107	<i>fmbratum</i> . . . . .	429	<i>moniliuerve</i> . . . . .	524
<i>tetrapetalus</i> . . . . .	170, 731	<i>gracile</i> . . . . .	429	<i>novæ-Hollandiæ</i> . . . . .	525
<i>Lotus (?) arboreus</i> . . . . .	50	<i>Hectori</i> . . . . .	430	<i>novæ-Zelandiæ</i> . . . . .	525
<i>Loxsonia</i> . . . . .	357	<i>hemitrichodes</i> . . . . .	431	<i>nulans</i> . . . . .	526
<i>Cunninghamii</i> . . . . .	358	<i>incurvifolium</i> . . . . .	431	<i>Taylorianum</i> . . . . .	524
<i>Luzula</i> . . . . .	292	<i>ligulare</i> . . . . .	430	<i>tenacifolium</i> . . . . .	524
<i>campestris</i> . . . . .	292, 745	<i>longipes</i> . . . . .	429	<i>Mastigophora</i> . . . . .	752
<i>Colensoi</i> . . . . .	293	<i>longirostre</i> . . . . .	429	<i>Mastocarpus alveatus</i> . . . . .	699
<i>crinita</i> . . . . .	293	<i>mauritianum</i> . . . . .	430	<i>Radula</i> . . . . .	700
<i>Oldfieldii</i> . . . . .	293	<i>microphyllum</i> . . . . .	430	<i>stiriatus</i> . . . . .	700
<i>picta</i> . . . . .	292	<i>microstomum</i> . . . . .	431	<i>Mazus</i> . . . . .	202
<i>pumila</i> . . . . .	293	<i>microstomum</i> . . . . .	429, 431	<i>Pumilio</i> . . . . .	202, 738
<i>Lycopodon</i> . . . . .	618	<i>Mosmannianum</i> . . . . .	429	<i>Meesia</i> . . . . .	444
<i>cælatum</i> . . . . .	618	<i>orthophyllum</i> . . . . .	430	<i>macrantha</i> . . . . .	444
<i>Pontanesei</i> . . . . .	618	<i>piliferum</i> . . . . .	432	<i>Melaleuca florida</i> . . . . .	71
<i>gemmatum</i> . . . . .	619	<i>prorepens</i> . . . . .	431	<i>lucida</i> . . . . .	71
<i>giganteum</i> . . . . .	618	<i>recurvifolium</i> . . . . .	430	<i>perforata</i> . . . . .	73
<i>microspermum</i> . . . . .	619	<i>retusum</i> . . . . .	432	<i>Melanospermeæ</i> . . . . .	647
<i>novæ-Zelandiæ</i> . . . . .	618	<i>sulcatum</i> . . . . .	428	<i>Melanthalia</i> . . . . .	687
<i>pusillum</i> . . . . .	618	<i>tongense</i> . . . . .	432	<i>abscissa</i> . . . . .	688
<i>pyriforme</i> . . . . .	619	<i>Macropiper excelsum</i> . . . . .	740	<i>Jaubertiana</i> . . . . .	688
<i>reticulatum</i> . . . . .	619	<i>Macrosporium</i> . . . . .	626	<i>Melaspilea</i> . . . . .	591
<i>Lycopodiaceæ</i> . . . . .	387	<i>obtusum</i> . . . . .	626	<i>deformis</i> . . . . .	591
<i>Lycopodium</i> . . . . .	388	<i>Madotheca</i> . . . . .	531, 752	<i>Meliaceæ</i> . . . . .	40
<i>Billardieri</i> . . . . .	389, 750	<i>elegantula</i> . . . . .	531	<i>Melicope</i> . . . . .	39
<i>carolinianum</i> . . . . .	390	<i>partita</i> . . . . .	531	<i>simplex</i> . . . . .	40, 726
<i>cernuum</i> . . . . .	390	<i>Stangeri</i> . . . . .	531	<i>ternata</i> . . . . .	40
<i>clavatum</i> . . . . .	390	<i>Magnoliaceæ</i> . . . . .	9	<i>Melicytus</i> . . . . .	17
<i>decurrens</i> . . . . .	390	<i>Malvaceæ</i> . . . . .	29	<i>lanceolatus</i> . . . . .	17
<i>densum</i> . . . . .	389, 750	<i>Marasmius</i> . . . . .	605	<i>macrophyllus</i> . . . . .	17
<i>D'Urvillei</i> . . . . .	391	<i>caperatus</i> . . . . .	605	<i>mieranthus</i> . . . . .	17
<i>fastigiatum</i> . . . . .	390	<i>Marattia</i> . . . . .	386	<i>ramiflorus</i> . . . . .	17
<i>flagellaria</i> . . . . .	389	<i>salicina</i> . . . . .	386	<i>Meliola</i> . . . . .	637
<i>Jussieu</i> . . . . .	390	<i>Marchantia</i> . . . . .	544, 752	<i>amphitricha</i> . . . . .	637
<i>laterale</i> . . . . .	389	<i>foliacea</i> . . . . .	545	<i>Melobesia</i> . . . . .	681
<i>Lessonianum</i> . . . . .	390	<i>macropora</i> . . . . .	545	<i>antarctica</i> . . . . .	681
<i>magellanicum</i> . . . . .	390	<i>nitida</i> . . . . .	545	<i>calcareæ</i> . . . . .	681
<i>peruianum</i> . . . . .	390	<i>pileata</i> . . . . .	545	<i>Patena</i> . . . . .	681
<i>scariosum</i> . . . . .	390	<i>polymorpha</i> . . . . .	545	<i>verrucata</i> , var. . . . .	681
<i>Selago</i> . . . . .	389	<i>tabularis</i> . . . . .	545	<i>Mentha</i> . . . . .	225
<i>sulcinervium</i> . . . . .	389	<i>Marchantiæ</i> . . . . .		<i>Cunninghamii</i> . . . . .	225
<i>varium</i> . . . . .	389, 750	<i>Marginaria</i> . . . . .	649	<i>Meryta</i> . . . . .	104
<i>volubile</i> . . . . .	391, 750	<i>Boryana</i> . . . . .	650	<i>Sinclairii</i> . . . . .	104, 731
<i>Lygodium</i> . . . . .	385	<i>Gigas</i> . . . . .	650	<i>Mesembryanthemum</i> . . . . .	83
<i>articulatum</i> . . . . .	385, 749	<i>Urvilleana</i> . . . . .	650	<i>australe</i> . . . . .	83, 729
<i>Lyperanthus</i> . . . . .	270	<i>Urvilleana</i> . . . . .	650	<i>Mesogloia</i> . . . . .	660
<i>autarcticus</i> . . . . .	270	<i>Marsileaceæ</i> . . . . .	392	<i>intestinalis</i> . . . . .	660
<i>Macrocyttis</i> . . . . .	655	<i>Marsupidium</i> . . . . .	751, 753	<i>Mesotus</i> . . . . .	461
<i>comosa</i> . . . . .	650	<i>Mastigobryum</i> . . . . .	523, 751	<i>celatus</i> . . . . .	462
<i>Dubenii</i> . . . . .	656	<i>adnexum</i> . . . . .	525	<i>Meteorium</i> . . . . .	459
<i>pyriferæ</i> . . . . .	655	<i>affine</i> . . . . .	525	<i>cuspidiferum</i> . . . . .	459
<i>Macromitrium</i> . . . . .	428	<i>anisostomum</i> . . . . .	524	<i>flexicaule</i> . . . . .	459
<i>aristatum</i> . . . . .	432	<i>atro-virens</i> . . . . .	524	<i>molle</i> . . . . .	459
<i>asperulum</i> . . . . .	429	<i>Colensoanum</i> . . . . .	524	<i>nitens</i> . . . . .	459
		<i>convexum</i> . . . . .	524, 554	<i>pusillum</i> . . . . .	459

	Page		Page		Page
<i>Metrosideros</i> . . . . .	70	<i>Monimiaceæ</i> . . . . .	239	<i>pedunculata</i> . . . . .	74, 728
<i>albiflora</i> . . . . .	71	<i>Montia</i> . . . . .	27	<i>Ralphii</i> . . . . .	74
<i>buxifolia</i> . . . . .	73	<i>fontana</i> . . . . .	27	<i>Naiadæ</i> . . . . .	277
<i>Colensoi</i> . . . . .	72	<i>Morelotia gahniiæfor-</i>		<i>Nasturtium</i> . . . . .	10
<i>diffusa</i> . . . . .	71	<i>mis</i> . . . . .	307	<i>palustre</i> . . . . .	10
<i>diffusa</i> . . . . .	71	<i>Muhlenbeckia</i> . . . . .	236	<i>terrestre</i> . . . . .	10
<i>florida</i> . . . . .	70	<i>adpressa</i> . . . . .	236, 739	<i>Neckera</i> . . . . .	462
<i>florida</i> . . . . .	72	<i>axillaris</i> . . . . .	236	<i>glyptotheca</i> . . . . .	459
<i>Homeana</i> . . . . .	71	<i>complexa</i> . . . . .	236	<i>hymenodonta</i> . . . . .	463
<i>hypericifolia</i> . . . . .	71	<i>ephedroides</i> . . . . .	237, 739	<i>implexa</i> . . . . .	457
<i>lucida</i> . . . . .	71, 728	<i>Muhlenbergia mollicoma</i>	326	<i>lævigata</i> . . . . .	463
<i>lucida</i> . . . . .	71	<i>Sieberianu</i> . . . . .	326	<i>molle</i> . . . . .	459
<i>myrtifolia</i> . . . . .	71	<i>Musci</i> . . . . .	393	<i>pennata</i> . . . . .	463
<i>perforata</i> . . . . .	73	<i>Myclomium furcellatum</i>	691	<i>planifolia</i> . . . . .	463
<i>polymorpha</i> . . . . .	73	<i>Myoporum</i> . . . . .	224	<i>setosa</i> . . . . .	461
<i>robusta</i> . . . . .	72	<i>lætum</i> . . . . .	224, 739	<i>Nectria</i> . . . . .	633
<i>scandens</i> . . . . .	73	<i>Myosotidium</i> . . . . .	196	<i>illudens</i> . . . . .	634
<i>tomentosa</i> . . . . .	72	<i>nobile</i> . . . . .	196, 738	<i>polythalamia</i> . . . . .	634
<i>umbellata</i> . . . . .	71	<i>Myosotis</i> . . . . .	192	<i>Nemalion</i> . . . . .	690
<i>Metzgeria</i> . . . . .	542, 752	<i>albo-sericea</i> . . . . .	738	<i>ramulosum</i> . . . . .	691
<i>eriocaula</i> . . . . .	544	<i>antarctica</i> . . . . .	193	<i>Nemastoma</i> . . . . .	704
<i>furcata</i> . . . . .	542	<i>australis</i> . . . . .	193	<i>? attenuata</i> . . . . .	705
<i>prehensilis</i> . . . . .	543	<i>capitata</i> . . . . .	194	<i>Daviesii</i> . . . . .	705
<i>Microcalia australis</i>	137	<i>Forsteri</i> . . . . .	194	<i>endiviaefolia</i> . . . . .	705
<i>Microlaena</i> . . . . .	320	<i>Hectori</i> . . . . .	193	<i>intestinalis</i> . . . . .	705
<i>avenacea</i> . . . . .	320	<i>Lyallii</i> . . . . .	196	<i>pinната</i> . . . . .	705
<i>polynoda</i> . . . . .	320	<i>petiolata</i> . . . . .	195	<i>prolifera</i> . . . . .	705
<i>stipoides</i> . . . . .	320	<i>pulvinaris</i> . . . . .	193	<i>Nematoceras macrantha</i>	266
<i>Micromeria Cuning-</i>		<i>sa.rosa</i> . . . . .	196	<i>oblonga</i> . . . . .	266
<i>hamii</i> . . . . .	226	<i>spathulata</i> . . . . .	193	<i>rivularis</i> . . . . .	266
<i>Micropterygium</i> . . . . .	525	<i>Traversii</i> . . . . .	194	<i>rotundifolia</i> . . . . .	266
<i>nutans</i> . . . . .	526	<i>uniflora</i> . . . . .	192, 738	<i>triloba</i> . . . . .	265
<i>Microseris</i> . . . . .	164	<i>Myosurus</i> . . . . .	3	<i>Nephrodium</i> . . . . .	377
<i>Forsteri</i> . . . . .	164	<i>aristatus</i> . . . . .	3	<i>decompositum</i> . . . . .	378, 749
<i>pygmaea</i> . . . . .	164	<i>Myriangium inconspi-</i>		<i>glabellum</i> . . . . .	378
<i>Microtis</i> . . . . .	266	<i>cuum</i> . . . . .	589	<i>hispidum</i> . . . . .	378
<i>Banksii</i> . . . . .	267	<i>Myriogyne minuta</i> . . . . .	144	<i>molle</i> . . . . .	377, 749
<i>porrifolia</i> . . . . .	266	<i>Nyriophyllum</i> . . . . .	66	<i>squamulosum</i> . . . . .	377
<i>Mida eucalyptoides</i> . . . . .	247	<i>elatinoides</i> . . . . .	66	<i>thelypteris, β</i> . . . . .	377
<i>myrtifolia</i> . . . . .	247	<i>pedunculatum</i> . . . . .	67	<i>unitum</i> . . . . .	749
<i>salicifolia</i> . . . . .	247	<i>propinquum</i> . . . . .	66	<i>velutinum</i> . . . . .	378
<i>Mielichhoferia</i> . . . . .	437	<i>robustum</i> . . . . .	67	<i>Nephrolepis</i> . . . . .	379
<i>longisetata</i> . . . . .	437, 750	<i>variæfolium</i> . . . . .	66	<i>tuberosa</i> . . . . .	379
<i>tenuisetata</i> . . . . .	750	<i>variæfolium</i> . . . . .	67	<i>Nephroma</i> . . . . .	565
<i>Mimulus</i> . . . . .	202	<i>Myrsineæ</i> . . . . .	183	<i>australe</i> . . . . .	565
<i>radicans</i> . . . . .	202	<i>Myrsine</i> . . . . .	183	<i>cellulosum</i> . . . . .	566
<i>repens</i> . . . . .	202	<i>chathamica</i> . . . . .	730	<i>lævigatum</i> . . . . .	566
<i>Mitrasacme</i> . . . . .	737	<i>divaricata</i> . . . . .	184, 736	<i>Lyallii</i> . . . . .	566
<i>novæ-Zelandiæ</i> . . . . .	737	<i>montana</i> . . . . .	184	<i>pal lens</i> . . . . .	565
<i>Mniarum biflorum</i> . . . . .	234	<i>nummularia</i> . . . . .	184	<i>resupinatum</i> . . . . .	565, 566
<i>fasciculatum</i> . . . . .	234	<i>Richardiana</i> . . . . .	184	<i>schizocarpum</i> . . . . .	565
<i>pedunculatum</i> . . . . .	234	<i>ulicina</i> . . . . .	184	<i>Nephromium cellulosum</i>	566
<i>Mnium</i> . . . . .	444	<i>Salicella</i> . . . . .	184	<i>lævigatum</i> . . . . .	566
<i>rhynchophorum</i> . . . . .	444	<i>Myrtaceæ</i> . . . . .	69	<i>Lyallii</i> . . . . .	566
<i>rostratum</i> . . . . .	444	<i>Myrtus</i> . . . . .	73	<i>Nertera</i> . . . . .	119
<i>Monilia Billardieri</i> . . . . .	653	<i>bullata</i> . . . . .	74	<i>Cunninghamii</i> . . . . .	120
<i>Moniliformia Billardieri</i>	653	<i>obcordata</i> . . . . .	74, 728	<i>depressa</i> . . . . .	120

	Page		Page		Page
<i>dichondraefolia</i> . . .	120	<i>avicenniæfolia</i> . . .	127	<i>ramosa</i> . . .	91, 729
<i>gracilis</i> . . .	120	<i>Colensoi</i> . . .	124, 736	<i>Orthoceras</i> . . .	273
<i>setulosa</i> . . .	120	<i>Cunninghamii</i> . . .	126	<i>Solandri</i> . . .	273
<i>Nesodaphne</i> . . .	238	<i>cydoniæfolia</i> . . .	732	<i>strictum</i> . . .	273
<i>Tarairi</i> . . .	238	<i>dentata</i> . . .	126	<i>Orthodontium</i> . . .	436
<i>Tawa</i> . . .	239	<i>Forsteri</i> . . .	127, 732	<i>sulcatum</i> . . .	435
<i>Neuropogon melaxanthum</i>	564	<i>furfuracca</i> . . .	125	<i>Orthopogon æmulus</i> . . .	323
<i>Niphobolus rupestris</i> . . .	381	<i>Haastii</i> . . .	126, 732	<i>Orthotrichum</i> . . .	432
<i>glaber</i> . . .	382	<i>Hectori</i> . . .	128	<i>acutifolium</i> . . .	429
<i>Nitella</i> . . .	549	<i>ilicifolia</i> . . .	126	<i>angustifolium</i> . . .	433
<i>Hookeri</i> . . .	550	<i>insignis</i> . . .	125, 731	<i>calvum</i> . . .	432
<i>hyalina</i> . . .	549	<i>lacunosa</i> . . .	732	<i>crassifolium</i> . . .	433
<i>interrupta</i> . . .	550	<i>Lyallii</i> . . .	125	<i>gracile</i> . . .	429
<i>Nitophyllum</i> . . .	684	<i>moschata</i> . . .	127	<i>incurvifolium</i> . . .	431
<i>crispatum</i> . . .	685	<i>nitida</i> . . .	125	<i>longipes</i> . . .	429
<i>denticulatum</i> . . .	685	<i>nummularifolia</i> . . .	127, 732	<i>longirostre</i> . . .	429
<i>D'Urvillæi</i> . . .	685	<i>operina</i> . . .	124, 731	<i>luteum</i> . . .	433
<i>minus</i> . . .	684	<i>semidentata</i> . . .	124, 731	<i>microphyllum</i> . . .	431
<i>multinerve</i> . . .	685	<i>Solandri</i> . . .	128	<i>microstomum</i> . . .	431
<i>palmatum</i> . . .	684	<i>Traversii</i> . . .	732	<i>prorepens</i> . . .	431
<i>? punctatum</i> . . .	684	<i>virgata</i> . . .	128	<i>pumilum</i> . . .	432
<i>? suborbiculare</i> . . .	685	<i>Olomitrium perichætiæ</i>	405	<i>recurvifolium</i> . . .	430
<i>uncinatum</i> . . .	684	<i>Omalanthus nutans</i> . . .	248	<i>Oscillatoria</i> . . .	720
<i>variolosum</i> . . .	685	<i>Omalia</i> . . .	483	<i>Osmunda discolor</i> . . .	368
<i>Normandina</i> . . .	591	<i>auriculata</i> . . .	483	<i>procera</i> . . .	366
<i>Jungermanniæ</i> . . .	591	<i>falcifolia</i> . . .	483	<i>Ourisia</i> . . .	217
<i>Nostoc</i> . . .	720	<i>oblongifolia</i> . . .	483	<i>cæspitosa</i> . . .	219, 738
<i>verrucosum</i> . . .	720	<i>pulchella</i> . . .	483	<i>Colensoi</i> . . .	218
<i>Noteroclada</i> . . .	539	<i>Onagraricæ</i> . . .	75	<i>glandulosa</i> . . .	219, 739
<i>confluens</i> . . .	540	<i>Onoclea nuda</i> . . .	368	<i>macrocarpa</i> . . .	218, 738
<i>porphyrorhiza</i> . . .	539	<i>Opegrapha</i> . . .	587	<i>macrophylla</i> . . .	218
<i>Notheia</i> . . .	653	<i>agelæoides</i> . . .	588	<i>sessilifolia</i> . . .	218, 738
<i>anomala</i> . . .	653	<i>atra</i> . . .	587	<i>Oxalis</i> . . .	38
<i>Nothochlæna</i> . . .	383	<i>cioerca</i> . . .	587	<i>Cataractæ</i> . . .	38
<i>distans</i> . . .	383, 749	<i>gregaria</i> . . .	591	<i>corniculata</i> . . .	38
<i>Nothogenia tuberculosa</i>	701	<i>herpetica</i> . . .	587	<i>magellanica</i> . . .	38
<i>variolosa</i> . . .	701	<i>prominula</i> . . .	587	<i>Ozothamnus</i> . . .	146
<i>Notophana Toumatou</i> . . .	44	<i>spodopolia</i> . . .	588	<i>coralloides</i> . . .	147
<i>Notospartium</i> . . .	51	<i>subeffigurans</i> . . .	588	<i>depressus</i> . . .	146, 733
<i>Carmichæliæ</i> . . .	51, 727	<i>varia</i> . . .	587	<i>glomeratus</i> . . .	146, 733
<i>Notothlaspi</i> . . .	14	<i>Ophioglossum</i> . . .	386	<i>microphyllum</i> . . .	146
<i>australe</i> . . .	15	<i>coriaceum</i> . . .	386	<i>Selago</i> . . .	147
<i>rosulatum</i> . . .	15, 724	<i>costatum</i> . . .	386	<i>Vauvilliersii</i> . . .	146
<i>Nyctagineæ</i> . . .	228	<i>elongatum</i> . . .	386		
		<i>gramineum</i> . . .	386	<i>Pachycladon</i> . . .	724
<i>Octodiceræ Dillenii</i> . . .	409	<i>lusitanum</i> . . .	386	<i>novæ-Zelandiæ</i> . . .	724
<i>Ædemium</i> . . .	626	<i>vulgatum</i> . . .	386, 750	<i>Palmeæ</i> . . .	287
<i>robustum</i> . . .	626	<i>Ophrys unifolia</i> . . .	267	<i>Panax</i> . . .	100
<i>Olauciæ</i> . . .	41	<i>Oplismenus æmulus</i> . . .	323	<i>anomalum</i> . . .	101, 730
<i>Olea</i> . . .	186	<i>Orchidæ</i> . . .	260	<i>arboreum</i> . . .	102, 731
<i>apetula</i> . . .	186	<i>Oreobolus</i> . . .	308	<i>Colensoi</i> . . .	102, 730
<i>Cunninghamii</i> . . .	186	<i>pectinatus</i> . . .	308	<i>crassifolium</i> . . .	101, 730
<i>lanceolata</i> . . .	186	<i>Pumilio</i> . . .	303	<i>Edgerleyi</i> . . .	101, 730
<i>montana</i> . . .	187, 736	<i>Oreomyrrhis</i> . . .	90	<i>Lessonii</i> . . .	102, 730
<i>Olearia</i> . . .	123	<i>andicola</i> . . .	729	<i>lineare</i> . . .	101, 730
<i>albida</i> . . .	128	<i>Colensoi</i> . . .	91, 729	<i>longissimum</i> . . .	102, 730
<i>angustifolia</i> . . .	124	<i>Haastii</i> . . .	91	<i>simplex</i> . . .	100



	Page		Page		Page
Sinclairii . . . . .	103	perforata . . . . .	571	<i>Pellia carnosa</i> . . . . .	548
Pandaneæ . . . . .	275	perlata . . . . .	571	Peltigera . . . . .	566
Panicum . . . . .	323	pertusa . . . . .	572	<i>canina</i> . . . . .	566
? <i>gonatodes</i> . . . . .	324	pholidota . . . . .	575	polydactyla . . . . .	566
imbecille . . . . .	323	physodes . . . . .	572	rufescens . . . . .	566
Pannaria . . . . .	575	? picta . . . . .	574	Pemphidium . . . . .	636
Gayana . . . . .	575	<i>proboscidia</i> . . . . .	571	opacum . . . . .	636
gymnocheila . . . . .	576	pulverulenta . . . . .	573	Pennantia . . . . .	41, 726
immixta . . . . .	576	<i>punicea</i> . . . . .	579	<i>corymbosa</i> . . . . .	41
leucosticta . . . . .	576	<i>rubiginosa</i> . . . . .	574	Pentachondra . . . . .	178
microphylla . . . . .	576	<i>rupestris</i> . . . . .	577	pumila . . . . .	178
muscorum . . . . .	576	saxatilis . . . . .	571	Peperomia . . . . .	254
nigra . . . . .	576	<i>scruposa</i> . . . . .	580	Urvilleana . . . . .	254
nigrocineta . . . . .	575	speciosa . . . . .	573	<i>Periploca capsularis</i> . . . . .	188
pholidota . . . . .	575	<i>sphinctrina</i> . . . . .	575	Pernettya . . . . .	176
rubiginosa . . . . .	575	stellaris . . . . .	573	tasmanica . . . . .	176
triptophylla . . . . .	576	<i>subfusca</i> . . . . .	579	Persoonia . . . . .	241
Panus . . . . .	605	tiliacea . . . . .	571	Toro . . . . .	241
maculatus . . . . .	606	<i>triptophylla</i> . . . . .	576	Pertusaria . . . . .	580
stypticus . . . . .	605	<i>vuria</i> . . . . .	579	<i>communis</i> . . . . .	580
<i>Parablechnum procerum</i> . . . . .	366	<i>verrucosa</i> . . . . .	579	cucurbitula . . . . .	580
Parietaria . . . . .	252	Paronychia . . . . .	234	perflida . . . . .	580
debilis . . . . .	252	Paronsia . . . . .	187	perrimosa . . . . .	580
Parnelia . . . . .	570	albiflora . . . . .	187	subglobulifera . . . . .	580
angustata . . . . .	572	<i>capsularis</i> . . . . .	187, 188	subverrucosa . . . . .	580
aurea . . . . .	577	<i>heterophylla</i> . . . . .	187	velata . . . . .	580
cæsia . . . . .	573	rosea . . . . .	188	Petalophyllum . . . . .	540
caperata . . . . .	571	<i>rosea</i> . . . . .	188	Preissii . . . . .	540
chrysophthalma . . . . .	572	<i>variabilis</i> . . . . .	187	Peyssonellia . . . . .	690
chyrosticta . . . . .	578	Paspalum . . . . .	322	rugosa . . . . .	690
coarctata . . . . .	582	distichum . . . . .	323	Peziza . . . . .	628
conspersa . . . . .	571	<i>littorale</i> . . . . .	323	calycina . . . . .	628
diatrypa . . . . .	572	orbiculare . . . . .	323	campylospora . . . . .	628
<i>Domingensis</i> . . . . .	583	scrobiculatum . . . . .	333	chrysotricha . . . . .	629
<i>elegans</i> . . . . .	577	tenax . . . . .	746	Colensoi . . . . .	629
<i>enteromorpha</i> . . . . .	572	<i>Passerina axillaris</i> . . . . .	243	endocarpoides . . . . .	628
<i>Fensjonensis</i> . . . . .	575	<i>Gnidia</i> . . . . .	243	Kerguelensis . . . . .	628
flavicans . . . . .	572	<i>pilosa</i> . . . . .	243	miltina . . . . .	628
<i>frustulosa</i> . . . . .	579	<i>villosa</i> . . . . .	244	montiæcola . . . . .	629
<i>fulgens</i> . . . . .	577	Passiflora . . . . .	81	rhytidia . . . . .	628
<i>Gayana</i> . . . . .	575	tetrandra . . . . .	81	scutellata . . . . .	625
<i>gelida</i> . . . . .	576	Passifloreæ . . . . .	81, 729	stercorea . . . . .	628
<i>gossypina</i> . . . . .	581	Patellaria . . . . .	629	Phacelocarpus . . . . .	686
<i>gyrosa</i> ? . . . . .	582	atrata . . . . .	629	Labillardieri . . . . .	686
<i>imitatrix</i> . . . . .	572	nigro-cinnabariua . . . . .	629	Phalaris canariensis . . . . .	321
lævigata . . . . .	571	Paurocotylis . . . . .	617	Phascum . . . . .	402
lanuginosa . . . . .	576	pila . . . . .	617	apiculatum . . . . .	402
leucomela . . . . .	572	Pelargonium . . . . .	37	nervosum . . . . .	403
<i>molybdæa</i> . . . . .	576	<i>acugnaticum</i> . . . . .	37	Phebalium . . . . .	39
<i>moniliformis</i> . . . . .	572	australe, var. clandes- tinum . . . . .	37, 726	nudum . . . . .	39
Mougeotii . . . . .	574	clandestinum . . . . .	37	<i>Philippodendron regium</i> . . . . .	30
muscorum . . . . .	576	grossularioides . . . . .	37	<i>Philonotis appressum</i> . . . . .	448
<i>nigrocineta</i> . . . . .	575	Pellæa . . . . .	362	<i>australe</i> . . . . .	445
obscura . . . . .	573	falcata . . . . .	363	<i>pusillum</i> . . . . .	445
olivacea . . . . .	572	rotundifolia . . . . .	363	<i>Phlebothamnion scopar-</i> rium . . . . .	710
<i>pallescent</i> . . . . .	578	<i>seticaulis</i> . . . . .	363	<i>byssoidium</i> . . . . .	712
parietina . . . . .	573				

	Page		Page		Page
<i>Phleum pratense</i> . . .	321	<i>Pilidium</i> . . . . .	623	<i>annotina</i> . . . . .	507
<i>Phlyctæna</i> . . . . .	623	<i>Coriariæ</i> . . . . .	623	<i>ansata</i> . . . . .	506
<i>dissepta</i> . . . . .	623	<i>Pilopogon leptodum</i> .	416	<i>Arbuscula</i> . . . . .	505
<i>Phoma</i> . . . . .	622	<i>Pilotrichum setosum</i> .	461	<i>chiloscyphoidea</i> . .	508
<i>acmella</i> . . . . .	622	<i>Pimelia</i> . . . . .	242	<i>circinalis</i> . . . . .	504
<i>fallax</i> . . . . .	622	<i>arenaria</i> . . . . .	244, 740	<i>cognata</i> . . . . .	505
<i>Phormium</i> . . . . .	286	<i>buxifolia</i> . . . . .	243, 740	<i>Colensoi</i> ? . . . . .	506
<i>Colensoi</i> . . . . .	287	<i>Gnidia</i> . . . . .	243	<i>conjugata</i> . . . . .	504
<i>Cookianum</i> . . . . .	287	<i>lævigata</i> . . . . .	244	<i>connexa</i> . . . . .	504
<i>Forsterianum</i> . . . .	287	<i>longifolia</i> . . . . .	242	<i>detoidea</i> . . . . .	506
<i>tenax</i> . . . . .	286, 744	<i>Lyallii</i> . . . . .	245	<i>Dicksoni</i> . . . . .	506
<i>tenax, B</i> . . . . .	287	<i>pilosa</i> . . . . .	243	<i>falcata</i> . . . . .	518
<i>Phragmicoma olivacea</i> .	532	<i>prostrata</i> . . . . .	244	<i>fasciculata</i> . . . . .	506
<i>Phragmites</i> . . . . .	746	<i>prostrata, B</i> . . . .	244	<i>fuscella</i> . . . . .	505
<i>communis</i> . . . . .	746	<i>sericeo-villosa</i> . . .	245	<i>gigantea</i> . . . . .	505
<i>Phycobotrys Maschalo-</i>		<i>Traversii</i> . . . . .	243	<i>gregaria</i> . . . . .	507
<i>carpus</i> . . . . .	649	<i>Urvilleana</i> . . . . .	244	<i>hemicardia</i> . . . . .	505
<i>Phycopteris interrupta</i> .	657	<i>virgata</i> . . . . .	243	<i>incurvicolla</i> . . . .	507
<i>Phycoseris lobata</i> . . .	715	<i>Piperacæ</i> . . . . .	254	<i>lata</i> . . . . .	507, 753
<i>rigida</i> . . . . .	715	<i>Piper</i> . . . . .	254	<i>Lyallii</i> . . . . .	507
<i>Phyllocladus</i> . . . . .	259	<i>excelsum</i> . . . . .	254, 740	<i>microdictyum</i> . . . .	506
<i>alpinus</i> . . . . .	260, 741	<i>Pisonia</i> . . . . .	229	<i>pleurota</i> . . . . .	505
<i>rhomboidalis</i> . . . . .	259	<i>Brunonianana</i> . . . .	229, 739	<i>prolifera</i> . . . . .	504
<i>trichomanoides</i> . . . .	259, 741	<i>Sinclairii</i> . . . . .	229	<i>radiculosa</i> . . . . .	506
<i>Phylloglossum</i> . . . . .	388	<i>Pistillaria</i> . . . . .	615	<i>ramosissima</i> . . . . .	505
<i>Drummondii</i> . . . . .	388	<i>ovata</i> . . . . .	615	<i>Sinclairii</i> . . . . .	507
<i>Phyllogonium</i> . . . . .	462	<i>Pittosporæ</i> . . . . .	18	<i>Stephensoniana</i> . . .	505
<i>elegans</i> . . . . .	462	<i>Pittosporum</i> . . . . .	18	<i>Urvilleana</i> . . . . .	520
<i>callichroum</i> . . . . .	482	<i>Buchanani</i> . . . . .	725	<i>Plagiographis</i> . . . .	588
<i>Phyllophora obtusa</i> . .	702	<i>Colensoi</i> . . . . .	19, 725	<i>devia</i> . . . . .	588
<i>Phyllospora</i> . . . . .	650	<i>cornifolium</i> . . . . .	21	<i>rubrica</i> . . . . .	589
<i>comosa</i> . . . . .	650	<i>crassifolium</i> . . . . .	20	<i>Plantagineæ</i> . . . . .	226
<i>quercifolia</i> . . . . .	652	<i>elegans</i> . . . . .	21	<i>Plantago</i> . . . . .	226
<i>Phymatodes pustulata</i> .	382	<i>engenoides</i> . . . . .	21	<i>aucklandica</i> . . . . .	228
<i>Billardieri</i> . . . . .	382	<i>fasciculatum</i> . . . . .	20	<i>Brownii</i> . . . . .	227
<i>Physalis peruviana</i> . . .	200	<i>microcarpum</i> . . . . .	21	<i>carnosa</i> . . . . .	227
<i>Physcia cæsia</i> . . . . .	573	<i>obcordatum</i> . . . . .	20	<i>lanigera</i> . . . . .	227
<i>chrysophthalma</i> . . .	572	<i>patulum</i> . . . . .	19, 725	<i>major</i> . . . . .	739
<i>flavicans</i> . . . . .	572	<i>pinelioides</i> . . . . .	21	<i>Raoulii</i> . . . . .	228, 739
<i>leucomela</i> . . . . .	572	<i>pinelioides</i> . . . . .	19	<i>spathulata</i> . . . . .	227
<i>obscura</i> . . . . .	573	<i>radicans</i> . . . . .	20	<i>uniflora</i> . . . . .	227
<i>parietina</i> . . . . .	573	<i>reflexum</i> . . . . .	19	<i>varia</i> . . . . .	228
<i>pictu</i> ? . . . . .	574	<i>rigidum</i> . . . . .	20, 725	<i>Platygraphis</i> . . . . .	588
<i>plinthiza</i> . . . . .	574	<i>tenuifolium</i> . . . . .	19	<i>inconspicua</i> . . . . .	588
<i>pulverulenta</i> . . . . .	573	<i>umbellatum</i> . . . . .	21, 725	<i>longifera</i> . . . . .	588
<i>speciosa</i> . . . . .	573	<i>Placodium</i> . . . . .	577	<i>microsticta</i> . . . . .	588
<i>stellaris</i> . . . . .	573	<i>elegans</i> . . . . .	577	<i>occulta</i> . . . . .	588
<i>Physcomitrium</i> . . . . .	451	<i>fulgens</i> . . . . .	577	<i>tumidula</i> . . . . .	588
<i>apophysatum</i> . . . . .	451	<i>murorum</i> . . . . .	577	<i>Platysma</i> . . . . .	565
<i>conicum</i> . . . . .	451	<i>Plagianthus</i> . . . . .	29	<i>glaucum</i> . . . . .	565
<i>Perottetii</i> . . . . .	451	<i>divaricatus</i> . . . . .	30	<i>sæpincola</i> . . . . .	565
<i>pusillum</i> . . . . .	451	<i>betulinus</i> . . . . .	30, 726	<i>Plectranthus australis</i> .	226
<i>pyriforme</i> . . . . .	451	<i>Lyallii</i> . . . . .	30	<i>Pleuroidium nervosum</i> .	403
<i>Pieris</i> . . . . .	165	<i>Plagioclasma</i> . . . . .	544	<i>Pleurophyllum</i> . . . .	128
<i>hieracioides</i> . . . . .	165	<i>australe</i> . . . . .	544	<i>criniferum</i> . . . . .	129
<i>Pilacre</i> . . . . .	627	<i>Plagiocbila</i> . . . . .	504	<i>speciosum</i> . . . . .	129
<i>divisa</i> . . . . .	627	<i>adiantoides</i> . . . . .	507	<i>Plocamium</i> . . . . .	694

	Page		Page		Page
abnorme . . . . .	695	palpebrifolius . . . . .	529	aterrima . . . . .	672
angustum . . . . .	695	reticulatus . . . . .	754	australis . . . . .	671
coccineum . . . . .	696	<i>Taylori</i> . . . . .	529	<i>Berkeleyi</i> . . . . .	673
Corallorhiza . . . . .	695	Polypodium . . . . .	379	<i>botryocarpa</i> . . . . .	665
costatum . . . . .	695	<i>adiantiforme</i> . . . . .	377	brachygona . . . . .	670
cruciferum . . . . .	695	<i>attenuatum</i> . . . . .	382	Brodiaei? . . . . .	670
dispermum . . . . .	696	australe . . . . .	380, 749	<i>byssocladus</i> . . . . .	671
<i>magellanicum</i> . . . . .	279	Billardieri . . . . .	382	cancellata . . . . .	672
procerum . . . . .	695	Cunninghamii . . . . .	381	ceratoclada . . . . .	668
Poa . . . . .	337	<i>elaegnifolium</i> . . . . .	381	<i>cladostephus</i> . . . . .	671
<i>affinis</i> . . . . .	339	Grammitidis . . . . .	380, 749	Colensoi . . . . .	667
anceps . . . . .	339	<i>medullare</i> . . . . .	349	comoides . . . . .	671
aunna . . . . .	340	<i>membranifolium</i> . . . . .	382	corymbifera . . . . .	671
australis, var. <i>lævis</i> . . . . .	339	<i>molle</i> . . . . .	377	decipiens . . . . .	671
<i>australis</i> . . . . .	337, 339	pennigerum . . . . .	381, 749	dendritica . . . . .	668
breviglumis . . . . .	337	pustulatum . . . . .	382, 749	dumosa . . . . .	669
Colensoi . . . . .	340	rugulosum . . . . .	381, 749	implexa . . . . .	668
exigua . . . . .	338	rupestre . . . . .	381	isogona . . . . .	671
foliosa . . . . .	338	<i>scandens</i> . . . . .	382	Lyallii . . . . .	670
imbecilla . . . . .	337, 746	<i>serpens</i> . . . . .	381	macra . . . . .	669
implexa . . . . .	337	<i>setosum</i> . . . . .	378	<i>Mallardiae</i> . . . . .	671
<i>kerquelensis</i> . . . . .	341	<i>stellatum</i> . . . . .	381	<i>microcarpa</i> . . . . .	670
<i>lævis</i> . . . . .	339	stylaticum . . . . .	380	naua . . . . .	670
Lindsayi . . . . .	340	tenellum . . . . .	380, 749	neglecta . . . . .	668
<i>littoralis</i> . . . . .	341	<i>viscidum</i> . . . . .	381	nigrescens . . . . .	672
ramosissima . . . . .	338	Polyporus . . . . .	606	pennata . . . . .	668
<i>Sieberiana</i> . . . . .	337	adustus . . . . .	607	<i>punicea</i> . . . . .	673
<i>Sprengelii</i> . . . . .	337	arcularius . . . . .	607	ramulosa . . . . .	672
<i>Podanthe squamata</i> . . . . .	519	australis . . . . .	608	rhododactyla . . . . .	670
Podocarpus . . . . .	257	borealis . . . . .	609	rudis . . . . .	669
? <i>biformis</i> . . . . .	259	catervatus . . . . .	609	<i>rytiphylæoides</i> . . . . .	672
dacrydioides . . . . .	258, 741	cinnabarinus . . . . .	609	strictissima . . . . .	669
<i>Dieffenbachii</i> . . . . .	211	Colensoi . . . . .	607	Sulivanæ . . . . .	668
ferruginea . . . . .	257, 740	dichrous . . . . .	608	variabilis . . . . .	670
<i>Matai</i> . . . . .	741	diffusus . . . . .	610	<i>Polystichum aristatum</i> . . . . .	375
nivalis . . . . .	257	hemitrophius . . . . .	608	<i>coriaceum</i> . . . . .	376
spicata . . . . .	253, 741	hirsutus . . . . .	609	<i>hispidum</i> . . . . .	378
<i>thuyoides</i> . . . . .	258	igniarius . . . . .	608	<i>vestitum</i> . . . . .	375
Totara . . . . .	258, 741	iridioides . . . . .	608	Polytrichum . . . . .	452
<i>zamiafolius</i> . . . . .	256	leucoplacus . . . . .	609	alpinum . . . . .	455
Podomitrium . . . . .	540	lucidus . . . . .	607	angustatum . . . . .	453
Phyllanthus . . . . .	541	oblectatus . . . . .	607	australe . . . . .	454
<i>Polybotrya nana</i> . . . . .	369	phlebophorus . . . . .	607	commune . . . . .	455
Polygonæ . . . . .	235	phlebeius . . . . .	608	crispulum . . . . .	453
Polygonum . . . . .	235	salicinus . . . . .	608	dendroides . . . . .	454
<i>australe</i> . . . . .	236	sanguineus . . . . .	609	gracile . . . . .	455
aviculare . . . . .	235	scruposus . . . . .	608	juniperinum . . . . .	455
<i>axillare</i> . . . . .	236	tabæinus . . . . .	609	magellanicum . . . . .	454
<i>complerum</i> . . . . .	236	vaporarius . . . . .	610	squamosum . . . . .	454
<i>ephedroides</i> . . . . .	236	velutinus . . . . .	609	<i>subulatum</i> . . . . .	458
minus . . . . .	235, 739	versicolor . . . . .	609	tenuirostre . . . . .	453
<i>prostratum</i> . . . . .	235	xerophyllus . . . . .	607	tortile . . . . .	454
Polyotus . . . . .	528	<i>Polyscias pinnata</i> . . . . .	731	Polyzonia . . . . .	673
allophylus . . . . .	754	Polysiphonia . . . . .	666	adiantiformis . . . . .	674
brachycladus . . . . .	529	abscissa . . . . .	669	bipartita . . . . .	674
claviger . . . . .	529	<i>abscissa</i> . . . . .	670	cuneifolia . . . . .	673
magellanicus . . . . .	529	amphibia . . . . .	669	<i>Colensoi</i> . . . . .	674

	Page		Page		Page
Harveyana . . . . .	674	<i>rubiginosum</i> . . . . .	574	<i>microcarpum</i> ? . . . . .	427
<i>Harveyi</i> . . . . .	674	<i>sphinctrinum</i> . . . . .	574	<i>protensum</i> . . . . .	426
<i>ovalifolia</i> . . . . .	674	<i>subpruinatum</i> . . . . .	574	<i>ptychophyllum</i> . . . . .	426
Pomaderris . . . . .	43	<i>xanthomelanum</i> . . . . .	575	<i>rupestre</i> . . . . .	426
Edgerleyi . . . . .	43	<i>Pterigophyllum micro-</i>		<i>symphiodon</i> . . . . .	426
<i>elliptica</i> . . . . .	43	<i>carpum</i> . . . . .	495	<i>Racopilum</i> . . . . .	490
<i>ericifolia</i> . . . . .	43	<i>Pterigynandrum ciliatum</i>	489	<i>australe</i> . . . . .	491
<i>phylicifolia</i> . . . . .	43	<i>Pteris</i> . . . . .	363	<i>cristatum</i> . . . . .	491
<i>Porina cucurbitula</i> . . . . .	580	<i>affinis</i> . . . . .	564	<i>laetum</i> . . . . .	491
<i>granulata</i> . . . . .	578	<i>aquilina</i> . . . . .	363, 748	<i>robustum</i> . . . . .	491
Porphyræ . . . . .	714	<i>Brunoniana</i> . . . . .	364	<i>spininervium</i> . . . . .	466
<i>capensis</i> . . . . .	715	<i>comans</i> . . . . .	364	<i>strumiferum</i> . . . . .	491
<i>columbina</i> . . . . .	715	<i>Endlicheriana</i> . . . . .	364	<i>tomentosum</i> . . . . .	491
<i>laciniosa</i> . . . . .	715	<i>esculenta</i> . . . . .	363	Radula . . . . .	529
<i>vulgaris</i> . . . . .	715	<i>fulcata</i> . . . . .	363	<i>aquilegia</i> . . . . .	530
Portulacæ . . . . .	26	<i>humilis</i> . . . . .	362	<i>buccinifera</i> . . . . .	530
Potamogeton . . . . .	278	<i>incisa</i> . . . . .	364, 748	<i>complanata</i> . . . . .	530
<i>gramineus</i> . . . . .	279	<i>macilenta</i> . . . . .	364	<i>dentata</i> . . . . .	531
<i>heterophyllum</i> . . . . .	279, 742	<i>montana</i> . . . . .	364	<i>marginata</i> . . . . .	530
<i>natans</i> . . . . .	278	<i>rotundifolia</i> . . . . .	363	<i>multicarinata</i> . . . . .	530
<i>oblongifolius</i> . . . . .	742	<i>scaberula</i> . . . . .	364, 748	<i>physoloba</i> . . . . .	530
<i>ochreateus</i> . . . . .	279	<i>tenuis</i> . . . . .	364	<i>plicata</i> . . . . .	530
<i>pectinatus</i> . . . . .	279	<i>tremula</i> . . . . .	364	<i>nvifera</i> . . . . .	530
Potentilla . . . . .	54	<i>vespertilionis</i> . . . . .	364	Ramalina . . . . .	564
<i>anserina</i> . . . . .	54, 727	<i>Pteroceras cancellatum</i>	708	<i>calicaris</i> . . . . .	564
<i>anserinoïdes</i> . . . . .	54	<i>Pterocladia</i> . . . . .	689	<i>inflata</i> . . . . .	564
Pozoa . . . . .	87	<i>lucida</i> . . . . .	689	<i>linearis</i> . . . . .	564
<i>exigua</i> . . . . .	87	<i>Pterostylis</i> . . . . .	268	<i>membranacea</i> . . . . .	564
<i>Haastii</i> . . . . .	88	<i>Banksii</i> . . . . .	268, 741	<i>scopulorum</i> . . . . .	565
<i>hydrocotyloides</i> . . . . .	88	<i>foliata</i> . . . . .	268	<i>usneoides</i> . . . . .	565
<i>reniformis</i> . . . . .	88	<i>graminea</i> . . . . .	268	Ranunculaceæ . . . . .	1
<i>Roughii</i> . . . . .	98	<i>micromega</i> . . . . .	268	Ranunculus . . . . .	3
<i>trifoliolata</i> . . . . .	88, 729	<i>puberula</i> . . . . .	269	<i>acaulis</i> . . . . .	8
<i>Prasiola crispa</i> . . . . .	715	<i>squamata</i> . . . . .	269	<i>aucklandicus</i> . . . . .	723
<i>antarctica</i> . . . . .	715	<i>trullifolia</i> . . . . .	269	<i>acris</i> . . . . .	7
<i>Prasophyllum</i> . . . . .	272	<i>Ptilonia</i> . . . . .	678	<i>australis</i> . . . . .	8
<i>Colensoi</i> . . . . .	272	<i>magellanica</i> . . . . .	679	<i>Buchanani</i> . . . . .	5, 723
<i>nudum</i> . . . . .	272	<i>Ptilota</i> . . . . .	708	<i>chordorrhizos</i> . . . . .	723
<i>pumilum</i> . . . . .	273	<i>formosissima</i> . . . . .	708	<i>crithmifolius</i> . . . . .	6
<i>tunicatum</i> . . . . .	272	<i>pellucida</i> . . . . .	709	<i>geraniifolius</i> . . . . .	5, 723
Pratia . . . . .	171	<i>Puccinia</i> . . . . .	624	<i>Godleyanus</i> . . . . .	723
<i>angulata</i> . . . . .	172	<i>compacta</i> . . . . .	624	<i>gracilipes</i> . . . . .	8, 724
? <i>linnæoides</i> . . . . .	172	<i>graminis</i> . . . . .	624	<i>Haastii</i> . . . . .	6, 724
? <i>macrodon</i> . . . . .	173	<i>Pygmea</i> . . . . .	217	<i>insignis</i> . . . . .	4
? <i>perpusilla</i> . . . . .	172	<i>ciliolata</i> . . . . .	217	<i>lappaceus, var.</i> . . . .	7
Primulacæ . . . . .	185	<i>pulvinaris</i> . . . . .	217	<i>Lyallii</i> . . . . .	4, 723
Prionitis . . . . .	704	Quintinia . . . . .	58	<i>macropus</i> . . . . .	7, 724
<i>Colensoi</i> . . . . .	704	<i>elliptica</i> . . . . .	59	<i>multiscapus</i> . . . . .	7
Proteacæ . . . . .	240	<i>serrata</i> . . . . .	58	<i>nivicola</i> . . . . .	5
<i>Pseudopanax</i> . . . . .	730	Racomitrium . . . . .	425	<i>pachyrrhizus</i> . . . . .	8
<i>Psiloclada</i> . . . . .	518	<i>chlorocarpum</i> . . . . .	426	<i>parviflorus, var.</i> . . . .	8
<i>clandestina</i> . . . . .	518	<i>crispulum</i> . . . . .	426	<i>punguis</i> . . . . .	4
<i>Psilotum</i> . . . . .	391	<i>convolutum</i> . . . . .	426	<i>plebeius</i> . . . . .	7
<i>triquetrum</i> . . . . .	391, 750	<i>fasciculare</i> . . . . .	426, 427	<i>rivularis</i> . . . . .	8
Psoroma . . . . .	574	<i>lanuginosum</i> . . . . .	427	<i>sericophyllum</i> . . . . .	6, 724
<i>euphyllum</i> . . . . .	575			<i>sessiliflorus</i> . . . . .	9
<i>hypoaurum</i> . . . . .	574			<i>Sinclairii</i> . . . . .	6



	Page		Page		Page
subscaposus . . .	7	epimcnoides . . .	693	<i>fruticosa</i> . . .	231
Traversii . . .	4, 723	<i>Hombroiana</i> . . .	697	Samolus . . .	185
Raoulia . . .	147	lanceolata . . .	692	littoralis . . .	185, 737
australis . . .	148	liucaris . . .	692	Santalaceæ . . .	246
bryoides . . .	150	<i>lusoria</i> . . .	701	Santalum . . .	247
eximia . . .	149	<i>membranacca</i> . . .	694	Cunninghamii . . .	247
glabra . . .	149	<i>Montagneana</i> . . .	687	<i>Mida</i> . . .	247
grandiflora . . .	150, 733	ornata . . .	692	Sapindaceæ . . .	44
Haastii . . .	143	<i>Palmetta</i> . . .	692	Sapota . . .	185
Hectori . . .	149	prolifera . . .	692	costata . . .	186
mamillaris . . .	150	sanguinea . . .	692	Sapotæ . . .	185
Munroi . . .	148	<i>variegata</i> . . .	697	Sarcochilus . . .	263
subsericea . . .	150	Rhytiplœa . . .	663	adversus . . .	263
subulata . . .	149	delicatula . . .	664	Sarcodia . . .	686
tenuicaulis . . .	148, 733	pinastroides . . .	664	Montagneana . . .	687
Reboulia . . .	546	Ricasolia . . .	570	<i>Sarcomitrium alterni-</i>	
hemisphærica . . .	546	coriacea . . .	570	<i>lobum</i> . . .	543
<i>Renealmia grandiflora</i> . . .	274	glomulifera . . .	570	<i>cochleatum</i> . . .	544
Restiaceæ . . .	293	herbacea . . .	570	<i>crassum</i> . . .	543
Rhabdothermus . . .	221	Montagnei . . .	570	<i>ericaulium</i> . . .	544
Solandri . . .	221, 739	Riccia . . .	548	<i>multifidum</i> . . .	543
Rhamnæ . . .	42	acuminata . . .	548	<i>palmatum</i> . . .	543
Rhipogonum . . .	280	<i>cochleata</i> . . .	544	<i>pinnatifidum</i> . . .	543
<i>parviflorum</i> . . .	281	fluitans . . .	548	<i>prehensile</i> . . .	543
scandens . . .	281, 742	natans . . .	548	Sargassum . . .	647
Rhizogonum . . .	484	<i>squamata</i> . . .	519	adenophyllum . . .	648
bifarum . . .	485	<i>Ronabea australis</i> . . .	112	bacciferum . . .	648
distichum . . .	484	Rosaceæ . . .	53	<i>capillifolium</i> . . .	647
mnoides . . .	485	Rostkovia . . .	291	crassifolium . . .	648
<i>Mossmanianum</i> . . .	485	gracilis . . .	292, 745	droserifolium . . .	648
<i>Muelleri</i> . . .	484	magellanica . . .	291	duplicatum . . .	648
novæ-Hollandiæ . . .	484	<i>Rottbællia uniflora</i> . . .	325	<i>flexuosum</i> . . .	647
pennatum . . .	484	Rubiaceæ . . .	110	granuliferum . . .	648
spiniforme . . .	485	Rubus . . .	54	<i>Lessonianum</i> . . .	650
subbasilare . . .	485	australis . . .	54	<i>pennigerum</i> . . .	647
Rhodomela . . .	664	<i>cissoides</i> . . .	54	plumosum . . .	647
? <i>botryocarpa</i> . . .	665	<i>schmidelioides</i> . . .	54	Raoulii . . .	647
cæspitosa . . .	664	Rumex . . .	237	scabridum . . .	648
concinna . . .	664	<i>Brownianus</i> . . .	237	Sinclairii . . .	648
Gaimardi . . .	664	crispus . . .	237	vulgare . . .	648
? <i>Gaimardi</i> . . .	665	<i>cuneifolius</i> , $\beta$ . . .	237	longifolium . . .	647
glomculata . . .	665	<i>Cunninghamii</i> . . .	237	<i>Phyllanthum</i> . . .	649
<i>Hookeriana</i> . . .	664	acetosa . . .	237	<i>Urvilleanum</i> . . .	650
<i>multicornis</i> . . .	689	<i>fimbriatus</i> . . .	237	Saxifrageæ . . .	57
? <i>spinella</i> . . .	689	flexuosus . . .	237	Scaberia . . .	650
Rhodophyllis . . .	693	obtusifolius . . .	237	Agardhii . . .	650
? angustifrons . . .	694	Ruppia . . .	279	Scævola . . .	173
bifida . . .	693	maritima . . .	279	gracilis . . .	173
Gunnii . . .	693	Rutaceæ . . .	38	<i>novæ-Zelandiæ</i> . . .	173
? lacerata . . .	694	Saccogyna . . .	520	<i>Scandix glochidiata</i> . . .	99
membranacca . . .	694	australis . . .	520	Scapania . . .	511
<i>Montagneana</i> . . .	687	Salicornia . . .	233	densifolia . . .	512
Rhodospemeæ . . .	662	<i>australis</i> . . .	233	<i>vertebralis</i> . . .	512
Rhodymenia . . .	692	indica . . .	233	Schefflera . . .	103
corallina . . .	693	Salsola . . .	232	digitata . . .	103
? <i>coriacea</i> . . .	687	australis . . .	232	<i>Schisma Scolopendra</i> . . .	523
dichotoma . . .	693			<i>Schistidium apocarpum</i> . . .	424

	Page		Page		Page
<i>Schizaea</i> . . . . .	385	<i>juniperina</i> . . . . .	527	<i>Sonchus</i> . . . . .	165
<i>australis</i> . . . . .	386	<i>ochroleuca</i> . . . . .	528	<i>oleraceus</i> . . . . .	166, 735
<i>bifida</i> . . . . .	385, 750	<i>Scolopendra</i> . . . . .	528	<i>Sophora</i> . . . . .	52
<i>dichotoma</i> . . . . .	385, 750	<i>Senecio</i> . . . . .	157	<i>tetraptera</i> . . . . .	52, 707
<i>fistulosa</i> . . . . .	750	<i>angustifolius</i> . . . . .	734	<i>Sparganium</i> . . . . .	276
<i>propinqua</i> . . . . .	385	<i>argutus</i> . . . . .	157	<i>simplex</i> . . . . .	277, 742
<i>pectinata</i> . . . . .	386	<i>Banksii</i> . . . . .	160, 734	<i>Spergula affinis</i> . . . . .	25
<i>Schizonema</i> . . . . .	721	<i>bellidioides</i> . . . . .	159, 734	<i>apetala</i> . . . . .	25
<i>crispum</i> . . . . .	721	<i>Bidwillii</i> . . . . .	162	<i>Spergularia</i> . . . . .	25
<i>Schizophyllum</i> . . . . .	606	<i>bifistulosus</i> . . . . .	161, 734	<i>rubra, var. marina</i> . . . . .	25, 725
<i>commune</i> . . . . .	606	<i>cassinoides</i> . . . . .	163, 734	<i>Sphacelaria</i> . . . . .	660
<i>Schlotheimia</i> . . . . .	427	<i>Colensoi</i> . . . . .	160	<i>botryoclada</i> . . . . .	661
<i>Brownii</i> . . . . .	427	<i>elæagnifolius</i> . . . . .	162, 734	<i>Callitricha</i> . . . . .	710
<i>Campbelliana</i> . . . . .	427	<i>glastifolius</i> . . . . .	161	<i>funicularis</i> . . . . .	661
<i>quadrifida</i> . . . . .	427	<i>Greyii</i> . . . . .	161	<i>hordeacea</i> . . . . .	661
<i>sulcata</i> . . . . .	429	<i>Haastii</i> . . . . .	159	<i>paniculata</i> . . . . .	661
<i>Schœnus</i> . . . . .	297	<i>Huntii</i> . . . . .	734	<i>pulvinata</i> . . . . .	661
<i>axillaris</i> . . . . .	298	<i>Lagopus</i> . . . . .	158	<i>virgata</i> . . . . .	661
<i>Brownii</i> . . . . .	298	<i>latifolius</i> . . . . .	159, 734	<i>Sphæria</i> . . . . .	634
<i>concinus</i> . . . . .	299	<i>lautus</i> . . . . .	160	<i>Acetabulum</i> . . . . .	636
<i>nitens</i> . . . . .	299	<i>Lyallii</i> . . . . .	160	<i>coffea</i> . . . . .	635
<i>pauciflorus</i> . . . . .	298	<i>Munroi</i> . . . . .	162	<i>cryptospila</i> . . . . .	636
<i>tenax</i> . . . . .	298	<i>neglectus</i> . . . . .	160	<i>depressa</i> . . . . .	635
<i>Tendo</i> . . . . .	298	<i>odoratus</i> . . . . .	160, 734	<i>fragilis</i> . . . . .	634
<i>Scinaia</i> . . . . .	691	<i>perdicioides</i> . . . . .	161	<i>herbarum</i> . . . . .	635
<i>furcellata</i> . . . . .	691	<i>prenanthoides</i> . . . . .	156	<i>Hugelii</i> . . . . .	631
<i>Scirpus</i> . . . . .	299	<i>quadridentatus</i> . . . . .	157	<i>Lindsayi</i> . . . . .	635
<i>foliatus</i> . . . . .	298	<i>radiolatus</i> . . . . .	734	<i>livida</i> . . . . .	635
<i>lacustris</i> . . . . .	300	<i>Reinoldii</i> . . . . .	734	<i>? nigrella</i> . . . . .	635
<i>maritimus</i> . . . . .	300	<i>rotundifolius</i> . . . . .	162, 734	<i>phæosticta</i> . . . . .	635
<i>triquetus</i> . . . . .	300	<i>rupicolus</i> . . . . .	160	<i>pulicaris</i> . . . . .	634
<i>Scleranthus</i> . . . . .	230	<i>saxifragoides</i> . . . . .	159	<i>pullularis</i> . . . . .	634
<i>biflorus</i> . . . . .	234	<i>sciadophilus</i> . . . . .	161	<i>rasa</i> . . . . .	634
<i>Scleroderma</i> . . . . .	619	<i>scorzoneroides</i> . . . . .	160	<i>Robertsii</i> . . . . .	631
<i>Geaster</i> . . . . .	619	<i>Traversii</i> . . . . .	734	<i>Saubinetii</i> . . . . .	634
<i>vulgare</i> . . . . .	619	<i>Sepedonium</i> . . . . .	627	<i>Sphaerocionium glandu-</i>	
<i>Scleroma</i> . . . . .	605	<i>chrysospermum</i> . . . . .	627	<i>liferum</i> . . . . .	355
<i>pygmæum</i> . . . . .	605	<i>Serapias regularis</i> . . . . .	271	<i>Sphærococcus Chauvinii</i> . . . . .	699
<i>Sclerotium durum</i> . . . . .	637	<i>Shawia avicenniaefolia</i> . . . . .	127	<i>coccineus</i> . . . . .	698
<i>Scorzonera scapigera</i> . . . . .	164	<i>furfuracea</i> . . . . .	125	<i>corallinus</i> . . . . .	693
<i>Scrophularinæ</i> . . . . .	200	<i>paniculata</i> . . . . .	127	<i>furcellatus</i> . . . . .	697
<i>Scutellaria</i> . . . . .	226	<i>Sheffeldia repens</i> . . . . .	185	<i>Labillardieri</i> . . . . .	686
<i>novæ-Zelandiæ</i> . . . . .	226	<i>Sicyos</i> . . . . .	82	<i>variegatus</i> . . . . .	697
<i>Scytosiphon lomentaria</i> . . . . .	659	<i>angulatus</i> . . . . .	82	<i>Spherophoron</i> . . . . .	559
<i>Scytothamnus</i> . . . . .	659	<i>Sieversia albiflora</i> . . . . .	55	<i>compressum</i> . . . . .	559
<i>australis</i> . . . . .	659	<i>Sisymbrium</i> . . . . .	11	<i>coralloides</i> . . . . .	559
<i>Sebæa</i> . . . . .	191	<i>novæ-Zelandiæ</i> . . . . .	11	<i>curtum</i> . . . . .	559
<i>gracilis</i> . . . . .	191	<i>Skitophyllum Dillenii</i> . . . . .	409	<i>tenerum</i> . . . . .	559
<i>ovata</i> . . . . .	191	<i>Smilax Rhipogonum</i> . . . . .	281	<i>Sphagnum</i> . . . . .	401
<i>Secotium</i> . . . . .	617	<i>Solanæ</i> . . . . .	200	<i>acutifolium</i> . . . . .	402
<i>erythrocephalum</i> . . . . .	617	<i>Solanum</i> . . . . .	200	<i>acutifolium</i> . . . . .	402
<i>lilacense</i> . . . . .	617	<i>aviculare</i> . . . . .	200, 738	<i>antarcticum</i> . . . . .	402
<i>Selliera</i> . . . . .	173	<i>laciniatum</i> . . . . .	200	<i>australe</i> . . . . .	402
<i>radicans</i> . . . . .	173, 736	<i>nigrum</i> . . . . .	200, 738	<i>compartum</i> . . . . .	401, 402
<i>Sendtnera</i> . . . . .	527	<i>Solenostoma</i> . . . . .	751, 753	<i>cuspidatum</i> . . . . .	401
<i>attenuata</i> . . . . .	528	<i>Solidago arborescens</i> . . . . .	126, 161	<i>cymbifolium</i> . . . . .	402
<i>flagellifera</i> . . . . .	528	<i>Soliva tenella</i> . . . . .	141, 143	<i>funbriatum</i> . . . . .	402

	Page		Page		Page
novo-Zelandicum . . .	401	<i>cyparoides</i> . . .	475	<i>filicina</i> . . .	568
<i>plumosum</i> . . .	401	<i>ericoides</i> . . .	458	<i>fragillima</i> . . .	567
<i>recurvum</i> . . .	401	<i>gracile</i> . . .	465	<i>Hookeri</i> . . .	567
<i>subsecundum</i> . . .	401	<i>Jolliffii</i> . . .	474	<i>Stictophyllum membra-</i>	
<i>Spinifex</i> . . .	322	<i>Lagurus</i> . . .	457	<i>nacea</i> . . .	694
<i>hirsutus</i> . . .	322	<i>Lyallii</i> . . .	457	<i>Stigmatidium</i> . . .	589
<i>Spiranthes</i> . . .	271	<i>molle</i> . . .	459	<i>crassum</i> . . .	589
<i>australis</i> . . .	272	<i>sciuroides</i> . . .	459	<i>Stilbocarpa</i> . . .	99
<i>nova-Zelandiae</i> . . .	272	<i>Stereum</i> . . .	612	<i>polaris</i> . . .	100
<i>Spiridens setosus</i> . . .	461	<i>cinereo-badium</i> . . .	612	<i>Stilbum</i> . . .	626
<i>Splachnidium</i> . . .	653	<i>hirsutum</i> . . .	612	<i>lateritium</i> . . .	626
<i>rugosum</i> . . .	653	<i>latissimum</i> . . .	613	<i>Stipa micrantha</i> . . .	326
<i>Splachnum octoblepharis</i>	452	<i>lobatum</i> . . .	612	<i>Streptopogon mnioides</i>	420
<i>plugiopus</i> . . .	452	<i>papyrinum</i> . . .	612	<i>Styldieae</i> . . .	166
<i>purpurascens</i> . . .	452	<i>phaenum</i> . . .	612	<i>Styloidium</i> . . .	168
<i>Sporobolus</i> . . .	326	<i>rugosum</i> . . .	612	<i>graminifolium</i> . . .	168
<i>elongatus</i> . . .	327	<i>Sowerbei</i> . . .	612	<i>? subulatum</i> . . .	168
<i>Sporoehus</i> . . .	654	<i>vellereum</i> . . .	612	<i>Stypopodium Sinclairii</i>	657
<i>stylosus</i> . . .	654	<i>Sticta</i> . . .	566	<i>Suaeda</i> . . .	231
<i>Sprucea perichætialis</i>	405	<i>angustata</i> . . .	569	<i>maritima</i> . . .	231
<i>Spyridia</i> . . .	706	<i>argyracea</i> . . .	567	<i>Suttonia australis</i> . . .	184
<i>opposita</i> . . .	707	<i>aspera</i> . . .	567	<i>divaricata</i> . . .	184
<i>Squamaria</i> . . .	576	<i>aurata</i> . . .	569	<i>montana</i> . . .	184
<i>gelida</i> . . .	576	<i>Billardieri</i> . . .	569	<i>nummularia</i> . . .	184
<i>Stackhousia</i> . . .	42	<i>carpoloma</i> . . .	567	<i>salicina</i> . . .	184
<i>minima</i> . . .	42	<i>cellulifera</i> . . .	569	<i>Swainsonia</i> . . .	51
<i>Stackhousiæ</i> . . .	42	<i>cinereo-glaucæ</i> . . .	568	<i>nova-Zelandiae</i> . . .	51, 727
? <i>Staphylorhodos</i> Coto-		<i>coriacea</i> . . .	570	<i>Swammerdamia glome-</i>	
<i>neaster</i> . . .	57	<i>crocata</i> . . .	568	<i>rata</i> . . .	146
<i>Stectzia</i> . . .	541	<i>damacornis</i> . . .	568	<i>Symblypharis</i> . . .	405
<i>Lyellii</i> . . .	541	<i>endochrysa</i> . . .	569	<i>perichætialis</i> . . .	405
<i>tenuinervis</i> . . .	541	<i>filicina</i> . . .	568	<i>pumila</i> . . .	405
? <i>xiphioides</i> . . .	541	<i>fossulata</i> . . .	569	<i>Symphyogyna</i> . . .	541
<i>Stegania fluviatilis</i> . . .	366	<i>foveolata</i> . . .	569	<i>flabellata</i> . . .	541
<i>procera</i> . . .	366	<i>fragillima</i> . . .	567	<i>Hymenophyllum</i> . . .	542
<i>Stellaria</i> . . .	22	<i>Freyinetii</i> . . .	569	<i>leptopoda</i> . . .	542
<i>decipiens</i> . . .	23	<i>fuliginosa</i> . . .	569	<i>obovata</i> . . .	542
<i>elatinoides</i> . . .	23	<i>glaber</i> . . .	569	<i>Phyllanthus</i> . . .	541
<i>gracilentæ</i> . . .	24, 725	<i>glomulifera</i> . . .	570	<i>rhizobola</i> . . .	542
<i>parviflora</i> . . .	23	<i>granulata</i> . . .	568	<i>subsimplæx</i> . . .	542
<i>Roughii</i> . . .	23	<i>herbacea</i> . . .	570	<i>Taraxacum</i> . . .	165
<i>Stemonitis</i> . . .	620	<i>Hookeri</i> . . .	567	<i>Dens-leonis</i> . . .	165, 735
<i>ferruginea</i> . . .	621	<i>impressa</i> . . .	569	<i>Targionia</i> . . .	547
<i>typhoides</i> . . .	621	<i>latifrons</i> . . .	567	<i>hypophylla</i> . . .	547
<i>Stenogramme</i> . . .	696	<i>limbata</i> . . .	569	<i>Micheli</i> . . .	547
<i>interrupta</i> . . .	696	<i>linearis</i> . . .	569	<i>Temnoma</i> . . .	750, 753
<i>Stenostachys narduroides</i>	344	<i>Menziesii</i> . . .	568	<i>Tetragonia</i> . . .	83
<i>Stereocaulon</i> . . .	562	<i>Montagnei</i> . . .	570	<i>expansa</i> . . .	84
<i>Colensoi</i> . . .	562	<i>Mougeotiana</i> . . .	570	<i>implexicoma</i> . . .	729
<i>corticulatum</i> . . .	562	<i>orygmaea</i> . . .	568	<i>trigyna</i> . . .	84, 729
<i>denudatum</i> . . .	563	<i>Richardi</i> . . .	569	<i>Tetranthera</i> . . .	238
<i>ramulosum</i> . . .	562	<i>sinuosa</i> . . .	568	<i>calicaris</i> . . .	238, 739
<i>Argus</i> . . .	563	<i>Urvillei</i> . . .	569	<i>Tangao</i> . . .	739
<i>Stereodon angustatum</i> . . .	464	<i>variabilis</i> . . .	568	<i>Tetraphæa australis</i> . . .	82
<i>Arbuscula</i> . . .	465	<i>Stictina argyracea</i> . . .	567	<i>Teneridium</i> . . .	224, 739
<i>cerviculatum</i> . . .	474	<i>carpoloma</i> . . .	567	<i>parvifolium</i> . . .	224
<i>chrysogaster</i> . . .	475	<i>crocata</i> . . .	567		

	Page		Page		Page
Thamnolia . . . . .	563	Muelleri . . . . .	419	mutabile . . . . .	416
vermicularis . . . . .	563	papillosa . . . . .	418	perichætiale . . . . .	405
<i>Thamnophora magellanica</i> . . . . .	679	<i>robusta</i> , $\beta$ . . . . .	419	phæum . . . . .	416
<i>Cunninghamii</i> . . . . .	695	rubra . . . . .	419	rubripes . . . . .	417
<i>Theleophyton Billardieri</i> . . . . .	232	<i>rufiseta</i> . . . . .	420	setosum . . . . .	417
Thelephora . . . . .	611	serrulata . . . . .	419	strictum . . . . .	418
pedicellata . . . . .	611	torquata . . . . .	419	<i>Tridontium tasmanicum</i> . . . . .	410
<i>Sowerbei</i> . . . . .	612	Trachyloma . . . . .	463	Triglochin . . . . .	278
vaga . . . . .	611	<i>bifarium</i> . . . . .	485	<i>filifolium</i> . . . . .	278
Thelotrema . . . . .	580	<i>comosum</i> . . . . .	466	<i>flaccidum</i> . . . . .	278
lepadinum . . . . .	580	<i>Kerrii</i> . . . . .	466	triandrum . . . . .	278
monosporum . . . . .	580	planifolium . . . . .	463	Trigonanthus . . . . .	750, 753
Thelymitra . . . . .	270	<i>Trachypus cerinus</i> . . . . .	459	<i>Trineuron pusillum</i> . . . . .	139
Colensoi . . . . .	271	<i>Hornschuchii</i> . . . . .	459	<i>spathulatum</i> . . . . .	139
<i>Forsteri</i> . . . . .	270	Traversia . . . . .	163, 734	<i>Triodia kerguelensis</i> . . . . .	341
imberbis . . . . .	271	baccharoides . . . . .	164	<i>splendida</i> . . . . .	334
longifolia . . . . .	270	Trematodon . . . . .	415	Trisetum . . . . .	335
<i>pauciflora</i> . . . . .	271	arcuatus . . . . .	415	antarcticum . . . . .	335
pulchella . . . . .	271	flexipes . . . . .	415	subspicatum . . . . .	335
<i>stenopetala</i> . . . . .	271	<i>longicollis</i> . . . . .	415	Youngii . . . . .	335
uuiflora . . . . .	271	suberectus . . . . .	415	Triticum . . . . .	342
<i>Thlaspi</i> (?) <i>australe</i> . . . . .	15	<i>Trichilia monophylla</i> . . . . .	19	multiflorum . . . . .	342
<i>Thuja Doniana</i> . . . . .	256	Trichocolea . . . . .	527	<i>repens</i> . . . . .	342
Thymeleæ . . . . .	241	lanata . . . . .	527	scabrum . . . . .	342
<i>Thysananthus anguiformis</i> . . . . .	532	polyacantha . . . . .	527	<i>scabrum</i> . . . . .	342
<i>scutellatus</i> . . . . .	532	tomentella . . . . .	527	vulgare . . . . .	343
Tiliacæ . . . . .	32	<i>tomentella</i> , $\gamma$ . . . . .	527	Youngii . . . . .	343
Tillæa . . . . .	61	<i>Tricholoma elatinoïdes</i> . . . . .	203	<i>Trophis</i> (?) <i>opaca</i> . . . . .	252
debilis . . . . .	62	Trichomanes . . . . .	355	Trypethelium . . . . .	591
moschata . . . . .	61	<i>aureum</i> . . . . .	357	madreporiforme . . . . .	591
<i>muscosa</i> . . . . .	62	<i>bivalve</i> . . . . .	353	Tupeia . . . . .	108
purpurata . . . . .	62	Colensoi . . . . .	357	antarctica . . . . .	108
Steinclairii . . . . .	62	<i>Cunninghamii</i> . . . . .	356	<i>Cunninghamii</i> . . . . .	108
verticillaris . . . . .	62	<i>demissum</i> . . . . .	354	<i>pubigera</i> . . . . .	108
Tmesipteris . . . . .	391, 750	<i>dilatatum</i> . . . . .	354	Turbinaria . . . . .	648
Forsteri . . . . .	391	elongatum . . . . .	356	ornata . . . . .	649
<i>Tannensis</i> . . . . .	391	<i>Endlicherianum</i> . . . . .	357	Tylimanthus . . . . .	751, 753
Todea . . . . .	383	humile . . . . .	356	Tyndaridea . . . . .	719
africana . . . . .	384	<i>leptophyllum</i> . . . . .	356	anomala . . . . .	719
<i>hymenophylloides</i> . . . . .	384	Malingii . . . . .	357, 748	? byssoïdea . . . . .	719
<i>pellucida</i> . . . . .	384	<i>multifidum</i> . . . . .	353	Typha . . . . .	276
<i>superba</i> . . . . .	384	<i>pacificum</i> . . . . .	353	angustifolia . . . . .	276, 742
Tolypothrix . . . . .	720	reniforme . . . . .	356, 748	<i>latifolia</i> . . . . .	276, 742
irregularis . . . . .	720	rigidum . . . . .	748	Typhacæ . . . . .	276
<i>Torresia redolens</i> . . . . .	321	<i>squarrosum</i> . . . . .	351	<i>Ulota lutea</i> . . . . .	433
Tortula . . . . .	418	strictum . . . . .	356, 748	Ulva . . . . .	715
<i>antarctica</i> . . . . .	419	venosum . . . . .	357, 748	bullosa? . . . . .	715
australasie . . . . .	419	Trichoscytale . . . . .	617	crispa . . . . .	715
<i>cæspitosa</i> . . . . .	420	paradoxa . . . . .	617	latissima . . . . .	715
calycina . . . . .	420	Trichostomum . . . . .	416	<i>reticulata</i> . . . . .	715
chloronotos . . . . .	418	australe . . . . .	417	rigida . . . . .	715
crispifolia . . . . .	419	<i>convolutum</i> . . . . .	421	Umbelliferæ . . . . .	84
<i>fuscescens</i> . . . . .	420	elongatum . . . . .	417	Umbilicaria . . . . .	574
Knightsii . . . . .	420	laxifolium . . . . .	417	polyphylla . . . . .	574
mnioïdes . . . . .	420	leptodum . . . . .	416	Uncinia . . . . .	308
		lingulatum . . . . .	416	australis . . . . .	309
		<i>longifolium</i> . . . . .	417, 418		



	Page		Page		Page
<i>Banksii</i> . . . . .	310	<i>Buchanani</i> . . . . .	211	<i>immersa</i> . . . . .	592
<i>cæspitosa</i> . . . . .	310	<i>buxifolia</i> . . . . .	210	<i>magnospora</i> . . . . .	593
<i>compacta</i> . . . . .	309	<i>carnosula</i> . . . . .	210	<i>maura</i> . . . . .	592
<i>compacta</i> . . . . .	309	<i>cataractæ</i> . . . . .	216	<i>minutella</i> . . . . .	593
<i>distans</i> . . . . .	309	<i>Colensoi</i> . . . . .	209	<i>moniliformis</i> . . . . .	594
<i>divaricata</i> . . . . .	309	<i>cupressoides</i> . . . . .	212	<i>mutalis?</i> . . . . .	592
<i>ferruginea</i> . . . . .	309	<i>decussata</i> . . . . .	209	<i>nitida</i> . . . . .	593
<i>filiformis</i> . . . . .	310	<i>Dieffenbachii</i> . . . . .	206	<i>pallida</i> . . . . .	594
<i>Hookeri</i> . . . . .	310	<i>diosmæfolia</i> . . . . .	209	<i>punctiformis</i> . . . . .	593
<i>leptostachya</i> . . . . .	309	<i>elliptica</i> . . . . .	209, 738	<i>pyrenastroides</i> . . . . .	594
<i>riparia</i> . . . . .	310	<i>elongata</i> . . . . .	216	<i>rupestris</i> . . . . .	592
<i>rubra</i> . . . . .	310	<i>epacridea</i> . . . . .	213	<i>umbrina</i> . . . . .	592
<i>rupestris</i> . . . . .	310	<i>Haastii</i> . . . . .	213	<i>Vidalia Colensoi</i> . . . . .	663
<i>scabra</i> . . . . .	309	<i>Hectori</i> . . . . .	212	<i>Vincentia anceps</i> . . . . .	305
<i>Sinclairii</i> . . . . .	309	<i>Hookeriana</i> . . . . .	215	<i>Viola</i> . . . . .	16
<i>Urcularia</i> . . . . .	580	<i>Hulkeana</i> . . . . .	213	<i>filiceaulis</i> . . . . .	16
<i>cinerea</i> . . . . .	578	<i>lævis</i> . . . . .	209, 738	<i>Lyallii</i> . . . . .	16
<i>seruposa</i> . . . . .	580	<i>lævis, β</i> . . . . .	210	<i>Cunninghamii</i> . . . . .	16
<i>verrucosa</i> . . . . .	579	<i>Lavandiana</i> . . . . .	214	<i>Cunninghamii</i> . . . . .	16
<i>Uredo</i> . . . . .	624	<i>ligustrifolia</i> . . . . .	208	<i>Violarieæ</i> . . . . .	15
<i>antarctica</i> . . . . .	624	<i>Lindleyana</i> . . . . .	207	<i>Viscum</i> . . . . .	108
<i>Uromyces</i> . . . . .	624	<i>linifolia</i> . . . . .	214	<i>Lindsayi</i> . . . . .	108
<i>citriiformis</i> . . . . .	625	<i>Lyallii</i> . . . . .	215	<i>salicornioides</i> . . . . .	108, 731
<i>scariosa</i> . . . . .	625	<i>lycopodioides</i> . . . . .	211	<i>Vitex</i> . . . . .	223
<i>Urtica</i> . . . . .	251	<i>maerantha</i> . . . . .	213	<i>littoralis</i> . . . . .	223
<i>aucklandica</i> . . . . .	252	<i>macrocarpa</i> . . . . .	207	<i>Vittadinia</i> . . . . .	136
<i>australis</i> . . . . .	251, 740	<i>macroura</i> . . . . .	207	<i>australis</i> . . . . .	136, 733
<i>ferox</i> . . . . .	251	<i>Menziesii</i> . . . . .	209	<i>Wahlenbergia</i> . . . . .	169
<i>incisa</i> . . . . .	251, 740	<i>myrtifolia</i> . . . . .	207	<i>albo-marginata</i> . . . . .	170
<i>lucifuga</i> . . . . .	251	<i>nivalis</i> . . . . .	215	<i>cartilaginea</i> . . . . .	170
<i>Urticææ</i> . . . . .	250	<i>odora</i> . . . . .	210	<i>gracilis</i> . . . . .	169, 735
<i>Usnea</i> . . . . .	563	<i>parviflora</i> . . . . .	207	<i>saxicola</i> . . . . .	170
<i>angulata</i> . . . . .	564	<i>pimeleoides</i> . . . . .	211, 728	<i>Weinmannia</i> . . . . .	60
<i>barbata</i> . . . . .	563	<i>pinguifolia</i> . . . . .	210	<i>betulina</i> . . . . .	60
<i>melaxantha</i> . . . . .	564	<i>pubescens</i> . . . . .	208	<i>fuchsoides</i> . . . . .	60
<i>Ustilago</i> . . . . .	625	<i>Raoulii</i> . . . . .	214	<i>racemosa</i> . . . . .	61, 727
<i>bullata</i> . . . . .	625	<i>salicifolia</i> . . . . .	207, 738	<i>silvicola</i> . . . . .	60
<i>Candollei</i> . . . . .	625	<i>saticifolia</i> . . . . .	207	<i>Weissia</i> . . . . .	404
<i>endotricha</i> . . . . .	625	<i>salicornioides</i> . . . . .	212	<i>contacta</i> . . . . .	405
<i>urceolorum</i> . . . . .	625	<i>serpyllifolia</i> . . . . .	217	<i>controversa</i> . . . . .	404
<i>Utricularia</i> . . . . .	222	<i>spatulata</i> . . . . .	216	<i>crispula</i> . . . . .	404
<i>Colensoi</i> . . . . .	223	<i>speciosa</i> . . . . .	206	<i>flavipes</i> . . . . .	404
<i>monanthos</i> . . . . .	222	<i>stenophylla</i> . . . . .	207	<i>irrorata</i> . . . . .	404
<i>novæ-Zelandiæ</i> . . . . .	222	<i>stricta</i> . . . . .	207	<i>Winters axillaris</i> . . . . .	10
<i>protrusa</i> . . . . .	222	<i>tetragona</i> . . . . .	211, 738	<i>Wrangelia</i> . . . . .	691
<i>Vaucheria</i> . . . . .	714	<i>tetrasticha</i> . . . . .	212	<i>Lyallii</i> . . . . .	691
<i>Dilwynii</i> . . . . .	714	<i>Traversii</i> . . . . .	208, 738	<i>? squarrolosa</i> . . . . .	691
<i>Fauthiera australis</i> . . . . .	307	<i>vernicoosa</i> . . . . .	208	<i>Xeranthemum bellidiodi-</i>	
<i>Verbenaceæ</i> . . . . .	223	<i>Verrucaria</i> . . . . .	592	<i>des</i> . . . . .	152
<i>Veronica</i> . . . . .	204	<i>alba?</i> . . . . .	593	<i>Xiphophora Billardieri</i> . . . . .	652
<i>acutiflora</i> . . . . .	208	<i>binucleolata</i> . . . . .	593	<i>chondrophyllus</i> . . . . .	652
<i>Anagallis</i> . . . . .	216	<i>cellulosa</i> . . . . .	594	<i>Xylaria</i> . . . . .	631
<i>angustifolia</i> . . . . .	207, 208	<i>deliquesens</i> . . . . .	594	<i>anisopleuron</i> . . . . .	632
<i>arvensis</i> . . . . .	217	<i>epidermidis</i> . . . . .	593	<i>castorea</i> . . . . .	632
<i>Benthami</i> . . . . .	214	<i>gemmata</i> . . . . .	593	<i>Hypoxylon</i> . . . . .	632
<i>Bidwillii</i> . . . . .	215	<i>glabrata</i> . . . . .	594		
		<i>Haultaini</i> . . . . .	594		

	Page		Page		Page
<i>multiplex</i> . . . .	632	<i>Kunthii</i> . . . .	657	<i>Brownii</i> . . . .	434
<i>tuberiformis</i> . . . .	632	<i>Sinclairii</i> . . . .	657	<i>conoideus</i> , <i>B</i> . . . .	434
<i>Zannichellia</i> . . . .	279	<i>velutina</i> . . . .	657	<i>cyathicarpus</i> . . . .	434
<i>palustris</i> . . . .	280	<i>Zoopsis</i> . . . .	540	<i>denticulatus</i> . . . .	434
<i>Zanthoxylon novæ-Ze-</i>		<i>argentea</i> . . . .	540	<i>intermedius</i> . . . .	434
<i>landiæ</i> . . . .	240	<i>Zostera</i> . . . .	742	<i>Menziesii</i> . . . .	435
<i>Zonaria</i> . . . .	657	<i>marina</i> . . . .	742	<i>obtusifolius</i> . . . .	434
<i>dichotoma</i> . . . .	658	<i>Zoysia</i> . . . .	324	<i>Reinwardtii</i> . . . .	434
<i>flava</i> . . . .	657	<i>pungens</i> . . . .	324	<i>tristichus</i> . . . .	421
<i>interrupta</i> . . . .	657	<i>Zygodon</i> . . . .	433	<i>Zygogonium anomalum</i>	719
		<i>anomalus</i> . . . .	434		

THE END.







REEVE & CO.'S

PUBLICATIONS IN

Botany, Conchology, Entomology,

CHEMISTRY, TRAVELS, ANTIQUITIES,

ETC.

"None can express Thy works but he that knows them;  
And none can know Thy works, which are so many  
And so complete, but only he that owes them."

*George Herbert.*



LONDON :

REEVE & CO., 5, HENRIETTA STREET, COVENT GARDEN.

1867.

# CONTENTS.

	PAGE
BOTANY ... ..	3
FERNS ... ..	9
MOSSES AND SEAWEEDS ... ..	10
FUNGI ... ..	11
SHELLS AND MOLLUSKS ... ..	12
INSECTS ... ..	14
ANTIQUARIAN ... ..	16
TRAVELS ... ..	18
MISCELLANEOUS ... ..	19
NATURAL HISTORY FOR BEGINNERS ... ..	22
FORTHCOMING WORKS ... ..	24

*All Books sent post-free to any part of the United Kingdom on receipt of a remittance for the published price.*

*Post-Office Orders to be made payable at KING STREET, COVENT GARDEN.*

## LIST OF WORKS

### PUBLISHED BY REEVE & CO.

---

#### BOTANY.

---

**HANDBOOK OF THE BRITISH FLORA;** a Description of the Flowering Plants and Ferns indigenous to, or naturalized in, the British Isles. For the Use of Beginners and Amateurs. By **GEORGE BENTHAM, F.R.S.**, President of the Linnean Society. New Edition, Crown 8vo, 680 pp., 12s.

Distinguished for its terse and clear style of description; for the introduction of a system of Analytical Keys, which enable the student to determine the family and genus of a plant at once by the observation of its more striking characters; and for the valuable information here given for the first time of the geographical range of each species in foreign countries.

---

**HANDBOOK OF THE BRITISH FLORA, ILLUSTRATED** EDITION; a Description (with a Wood-Engraving, including dissections, of each species) of the Flowering Plants and Ferns indigenous to, or naturalized in, the British Isles. By **GEORGE BENTHAM, F.R.S.**, President of the Linnean Society. Demy 8vo, 2 vols., 1154 pp., 1295 Wood-Engravings, from Original Drawings by **W. Fitch.** £3.10s.

An illustrated edition of the foregoing Work, in which every species is accompanied by an elaborate Wood-Engraving of the Plant, with dissections of its leading structural peculiarities.

---

**THE FIELD BOTANIST'S COMPANION;** a Familiar Account, in the Four Seasons, of the principal Wild Flowering Plants of the British Isles. By **THOMAS MOORE, F.L.S.** One volume, Demy 8vo, 424 pp. With 24 Coloured Plates, by **W. Fitch,** 21s.

An elegantly-illustrated volume, intended for Beginners, describing the plants most readily gathered in our fields and hedgerows, with the progress of the seasons. Dissections of the parts of the flowers are introduced among the Figures, so that an insight may be readily obtained not only of the Species and name of each plant, but of its structure and characters of classification.

**CURTIS'S BOTANICAL MAGAZINE**, comprising the Plants of the Royal Gardens of Kew, and of other Botanical Establishments. By Dr. J. D. HOOKER, F.R.S., Director of the Royal Gardens. Royal 8vo. Published Monthly, with 6 Plates, 3s. 6d. coloured. Vol. XXII. of the Third Series (being Vol. XCII. of the entire work) now ready, 42s. A Complete Set from the commencement may be had.

Descriptions and Drawings, beautifully coloured by hand, of newly-discovered plants suitable for cultivation in the Garden, Hothouse, or Conservatory.

---

**THE FLORAL MAGAZINE**, containing Figures and Descriptions of New Popular Garden Flowers. By the Rev. H. HONYWOOD DOMBRAIN, A.B. Imperial 8vo. Published Monthly, with 4 Plates, 2s. 6d. coloured. Vols. I. to V., each with 64 coloured plates, £2. 2s.

Descriptions and Drawings, beautifully coloured by hand, of new varieties of Flowers raised by the nurserymen for cultivation in the Garden, Hothouse, or Conservatory.

---

**THE TOURIST'S FLORA**; a Descriptive Catalogue of the Flowering Plants and Ferns of the British Islands, France, Germany, Switzerland, Italy, and the Italian Islands. By JOSEPH WOODS, F.L.S. Demy 8vo, 504 pp., 18s.

Designed to enable the lover of botany to determine the names of any wild plants he may meet with while journeying in our own country and the countries of the Continent most frequented by tourists. The author's aim has been to make the descriptions clear and distinct, and to comprise them within a volume of not inconvenient bulk.

---

**CONTRIBUTIONS TO THE FLORA OF MENTONE.**

By J. TRAHERNE MOGGRIDGE. Royal 8vo. Parts I. and II., each, 25 Coloured Plates, 15s.

In this work a full page is devoted to the illustration of each Species, the drawings being made by the author from specimens collected by him on the spot, and they exhibit in vivid colours the beautiful aspect which many of our wild flowers assume south of the Alps.

---

**A FLORA OF ULSTER, AND BOTANIST'S GUIDE TO THE NORTH OF IRELAND.** By G. DICKIE, M.D., F.L.S., Professor of Botany in the University of Aberdeen. A pocket volume, pp. 176, 3s.

A small volume, not exclusively of local interest, containing, as it does, much valuable information relative to the geographical and altitudinal range of the Species.



## A SECOND CENTURY OF ORCHIDACEOUS PLANTS,

selected from the subjects published in Curtis's 'Botanical Magazine' since the issue of the 'First Century.' Edited by JAMES BATEMAN, Esq., F.R.S. Royal 4to. Parts I. to V., each with 10 Coloured Plates, 10s. 6d., now ready.

During the fifteen years that have elapsed since the publication of the 'Century of Orchidaceous Plants,' now out of print, the 'Botanical Magazine' has been the means of introducing to the public nearly two hundred of this favourite tribe of plants not hitherto described and figured, or very imperfectly so. It is intended from these to select "a Second Century," and the descriptions, written at the time of publication by Sir W. J. Hooker, will be edited, and in many cases re-written, agreeably with the present more advanced state of our knowledge and experience in the cultivation of Orchidaceous plants, by Mr. Bateman, the acknowledged successor of Dr. Lindley as the leading authority in this department of botany and horticulture.

## MONOGRAPH OF ODONTOGLOSSUM, a Genus of the

Vandeuse Section of Orchidaceous Plants. By JAMES BATEMAN, Esq., F.R.S. Imperial folio. Parts I. to III., each with 5 Coloured Plates, and occasional Wood Engravings, 21s.

Designed for the illustration, on an unusually magnificent scale, of the new and beautiful plants of this favoured genus of *Orchidacea*, which are being now imported from the mountain-chains of Mexico, Central America, New Granada, and Peru.

## SELECT ORCHIDACEOUS PLANTS. By ROBERT

WARNER, F.R.H.S. With Notes on Culture by B. S. WILLIAMS. In Ten Parts, folio, each, with 4 Coloured Plates, 12s. 6d.; or, complete in one vol., cloth gilt, £6. 6s.

Second Series, Part I., 3 Coloured Plates, 10s. 6d.

## PESCATOREA. Figures of Orchidaceous Plants, chiefly

from the Collection of M. PESCATORE. Edited by M. LINDEN, with the assistance of MM. G. LUDDEMAN, J. E. PLANCHON, and M. G. REICHENBACH. Folio, 48 Coloured Plates, cloth, with morocco back, £5. 5s.

## THE RHODODENDRONS OF SIKKIM-HIMALAYA;

being an Account, Botanical and Geographical, of the Rhododendrons recently discovered in the Mountains of Eastern Himalaya, from Drawings and Descriptions made on the spot, by Dr. J. D. Hooker, F.R.S. By Sir W. J. Hooker, F.R.S. Folio, 30 Coloured Plates, £3. 16s.

Illustrations on a superb scale of the new Sikkim Rhododendrons, now being cultivated in England, accompanied by copious observations on their distribution and habits.

**GENERA PLANTARUM**, ad Exemplaria imprimis in Herbariis Kewensibus servata definita. By GEORGE BENTHAM, F.R.S., President of the Linnean Society, and Dr. J. D. HOOKER, F.R.S., Assistant-Director of the Royal Gardens, Kew. Vol. I. Part I. pp. 454. Royal 8vo, 21s. Part II., 14s.

This important work comprehends an entire revision and reconstruction of the Genera of Plants. Unlike the famous Genera Plantarum of Endlicher, which is now out of print, it is founded on a personal study of every genus by one or both authors. The First Part contains 56 Natural Orders and 1287 Genera. The Second contains 11 Orders and 712 Genera. The whole will be completed in Four or Five Parts.

**FLORA OF THE ANTARCTIC ISLANDS**; being Part I. of the Botany of the Antarctic Voyage of H.M. Discovery Ships 'Erebus' and 'Terror,' in the years 1839-1843. By Dr. J. D. HOOKER, F.R.S. Royal 4to. 2 vols., 574 pp., 200 Plates, £10. 15s. coloured. Published under the authority of the Lords Commissioners of the Admiralty.

The 'Flora Antarctica' illustrates the Botany of the southern districts of South America and the various Antarctic Islands, as the Falklands, Kerguelen's Land, Lord Auckland and Campbell's Island, and 1370 species are enumerated and described. The plates, which are executed by Mr. Fitch, and beautifully coloured, illustrate 370 species, including a vast number of exquisite forms of Mosses and Seaweeds.

**FLORA OF NEW ZEALAND**; being Part II. of the Botany of the Antarctic Voyage of H.M. Discovery Ships 'Erebus' and 'Terror,' in the years 1839-1843. By Dr. J. D. HOOKER, F.R.S. Royal 4to, 2 vols., 733 pp., 130 Plates. £16. 16s. coloured. Published under the authority of the Lords Commissioners of the Admiralty.

The 'Flora of New Zealand' contains detailed descriptions of all the plants, flowering and flowerless, of that group of Islands, collected by the Author during Sir James Ross's Antarctic Expedition; including also the collections of Cook's three voyages, Vancouver's voyages, etc., and most of them previously unpublished. The species described amount to 1767; and of the Plates, which illustrate 313 Species, many are devoted to the Mosses, Ferns, and Algæ, in which these Islands abound.

**FLORA OF TASMANIA**; being Part III. of the Botany of the Antarctic Voyage of H.M. Discovery Ships 'Erebus' and 'Terror,' in the years 1839-1843. By Dr. J. D. HOOKER, F.R.S. Royal 4to, 2 vols., 972 pp., 200 Plates, £17. 10s., coloured. Published under the authority of the Lords Commissioners of the Admiralty.

The 'Flora of Tasmania' describes all the Plants, flowering and flowerless, of that Island, consisting of 2203 Species, collected by the Author and others. The Plates, of which there are 200, illustrate 412 Species.

**ON THE FLORA OF AUSTRALIA**, its Origin, Affinities, and Distribution; being an Introductory Essay to the 'Flora of Tasmania.' By Dr. J. D. HOOKER, F.R.S. 128 pp., quarto, 10s.

**HANDBOOK OF THE NEW ZEALAND FLORA;** a

Systematic Description of the Native Plants of New Zealand, and the Chatham, Kermadec's, Lord Auckland's, Campbell's, and Macquarrie's Islands. By Dr. J. D. HOOKER, F.R.S. Demy 8vo. In Two Parts, each, 16s.; or in one vol., 32s. Published under the auspices of the Government of that colony.

A compendious account of the plants of New Zealand and outlying islands, published under the authority of the Government of that colony. The present Part contains the Flowering Plants, Ferns, and Lycopods; the Second Part, containing the remaining Orders of *Cryptogamia*, or Flowerless Plants, with Index and Catalogues of Native Names and of Naturalized Plants, will appear shortly.

**FLORA AUSTRALIENSIS;** a Description of the Plants of

the Australian Territory. By GEORGE BENTHAM, F.R.S., President of the Linnean Society, assisted by FERDINAND MUELLER, F.R.S., Government Botanist, Melbourne, Victoria. Demy 8vo. Vols. I., II., and III., 20s. each. Published under the auspices of the several Governments of Australia.

Of this great undertaking, the present volumes, of more than a thousand closely-printed pages, comprise about one-fourth. The materials are derived not only from the vast collections of Australian plants brought to this country by various botanical travellers, and preserved in the herbaria of Kew and of the British Museum, including those hitherto unpublished of Banks and Solander, of Captain Cook's first Voyage, and of Brown in Flinders', but from the very extensive and more recently collected specimens preserved in the Government Herbarium of Melbourne, under the superintendence of Dr. Ferdinand Mueller. The descriptions are written in plain English, and are masterpieces of accuracy and clearness.

**FLORA HONGKONGENSIS;** a Description of the Flow-

ering Plants and Ferns of the Island of Hongkong. By GEORGE BENTHAM, P.L.S. With a Map of the Island. Demy 8vo, 550 pp., 16s. Published under the authority of Her Majesty's Secretary of State for the Colonies.

The Island of Hongkong, though occupying an area of scarcely thirty square miles, is characterized by an extraordinarily varied Flora, partaking, however, of that of South Continental China, of which comparatively little is known. The number of Species enumerated in the present volume is 1056, derived chiefly from materials collected by Mr. Hinds, Col. Champion, Dr. Hance, Dr. Harland, Mr. Wright, and Mr. Wilford.

**FLORA OF THE BRITISH WEST INDIAN ISLANDS.**

By Dr. GRISEBACH, F.L.S. Demy 8vo, 806 pp., 37s. 6d. Published under the auspices of the Secretary of State for the Colonies.

Containing complete systematic descriptions of the Flowering Plants and Ferns of the British West Indian Islands, accompanied by an elaborate index of reference, and a list of Colonial names.

**FLORA VITIENSIS;** a Description of the Plants of the Viti or Fiji Islands, with an Account of their History, Uses, and Properties. By Dr. BERTHOLD SEEMANN, F.L.S. Royal 4to, Parts I. to V. each, 10 Coloured Plates, 15s. To be completed in 10 Parts.

This work owes its origin to the Government Mission to Viti, to which the author was attached as naturalist. In addition to the specimens collected, the author has investigated all the Polynesian collections of Plants brought to this country by various botanical explorers since the voyage of Captain Cook.

**ILLUSTRATIONS OF THE NUEVA QUINOLOGIA** OF PAVON, with Observations on the Barks described. By J. E. HOWARD, F.L.S. With 27 Coloured Plates by W. FITCH. Imperial folio, half-morocco, gilt edges, £6. 6s.

A superbly-coloured volume, illustrative of the most recent researches of Pavon and his associates among the Cinchona Barks of Peru.

**ILLUSTRATIONS OF SIKKIM-HIMALAYAN PLANTS,** chiefly selected from Drawings made in Sikkim, under the superintendence of the late J. F. CATHCART, Esq., Bengal Civil Service. The Botanical Descriptions and Analyses by Dr. J. D. HOOKER, F.R.S. Imperial folio, 24 Coloured Plates and an Illuminated Title-page by W. FITCH, £5. 5s.

**OUTLINES OF ELEMENTARY BOTANY,** as Introductory to Local Floras. By GEORGE BENTHAM, F.R.S., President of the Linnean Society. Demy 8vo, pp. 45, 2s. 6d.

**THE LONDON JOURNAL OF BOTANY.** Original Papers by eminent Botanists, Letters from Botanical Travellers, etc. Vol. VII., completing the Series. Demy 8vo, 23 Plates, 30s.

**JOURNAL OF BOTANY AND KEW MISCELLANY.** Original Papers by eminent Botanists, Letters from Botanical Travellers, etc. Edited by Sir W. J. HOOKER, F.R.S. Vols. IV. to IX., Demy 8vo. 12 Plates, £1. 4s. A Complete Set of 9 vols., half-calf, *scarce*, £10. 16s.

**ICONES PLANTARUM.** Figures, with brief Descriptive Characters and Remarks, of New and Rare Plants, selected from the Author's Herbarium. By Sir W. J. HOOKER, F.R.S. New Series, Vol. V., Royal 8vo, 100 plates, 3ls. 6d.



## SYNOPSIS OF BRITISH SEAWEEDS, compiled from

Dr. Harvey's 'PHYCOLOGIA BRITANNICA.' Small 8vo, 220 pp., 5s.

A Descriptive Catalogue of all the British Seaweeds, condensed from the 'Phycologia Britannica.' It comprises the characters, synonyms, habitats, and general observations, forming an extremely useful pocket volume of reference.

---

## FUNGI.

---

### OUTLINES OF BRITISH FUNGOLOGY, containing

Characters of above a Thousand Species of Fungi, and a Complete List of all that have been described as Natives of the British Isles. By the Rev. M. J. BERKELEY, M.A., F.L.S. Demy 8vo, 484 pp., 24 Coloured Plates, 30s.

Although entitled simply 'Outlines,' this is a good-sized volume, of nearly 500 pages, illustrated with more than 200 Figures of British Fungi, all carefully coloured by hand. Of above a thousand Species the characters are given, and a complete list of the names of all the rest.

---

### THE ESCULENT FUNGUSES OF ENGLAND. Con-

taining an Account of their Classical History, Uses, Characters, Development, Structure, Nutritious Properties, Modes of Cooking and Preserving, &c. By C. D. BADHAM, M.D. Second Edition. Edited by F. CURREY, F.R.S. Demy 8vo, 152 pp., 12 Coloured Plates, 12s.

A lively classical treatise, written with considerable epigrammatic humour, with the view of showing that we have upwards of 30 Species of Fungi abounding in our woods capable of affording nutritious and savoury food, but which, from ignorance or prejudice, are left to perish ungathered. "I have indeed grieved," says the Author, "when reflecting on the straitened condition of the lower orders, to see pounds of extempore beefsteaks growing on our oaks, in the shape of *Fistulina hepatica*; Puff-balls, which some have not inaptly compared to sweetbread; *Hydna*, as good as oysters; and *Agaricus deliciosus*, reminding us of tender lamb-kidney." Superior coloured Figures of the Species are given from the pencil of Mr. Fitch.

---

### ILLUSTRATIONS OF BRITISH MYCOLOGY, com-

prising Figures and Descriptions of the Funguses of interest and novelty indigenous to Britain. By Mrs. T. J. HUSSEY. Royal 4to; First Series, 90 Coloured Plates, £7. 12s. 6d.; Second Series, 50 Coloured Plates, £4. 10s.

This beautifully-illustrated work is the production of a lady who, being an accomplished artist, occupied the leisure of many years in accumulating a portfolio of exquisite drawings of the more attractive forms and varieties of British Fungi. The publication was brought to an end with the 140th Plate by her sudden decease. The Figures are mostly of the natural size, carefully coloured by hand.

## SHELLS AND MOLLUSKS.

—♦—

**ELEMENTS OF CONCHOLOGY**; an Introduction to the Natural History of Shells, and of the Animals which form them. By LOVELL REEVE, F.L.S. Royal 8vo, 2 vols., 478 pp., 62 Coloured Plates, £2. 16s.

Intended as a guide to the collector of shells in arranging and naming his specimens, while at the same time inducing him to study them with reference to their once living existence, geographical distribution, and habits. Forty-six of the plates are devoted to the illustration of the genera of shells, and sixteen to shells with the living animal, all beautifully coloured by hand.

~~~~~

**THE LAND AND FRESHWATER MOLLUSKS** indigenous to, or naturalized in, the British Isles. By LOVELL REEVE, F.L.S. Crown 8vo, 295 pp., Map, and 160 Wood-Engravings, 10s. 6d.

A complete history of the British Land and Freshwater Shells, and of the Animals which form them, illustrated by Wood-Engravings of all the Species. Other features of the work are an Analytical Key, showing at a glance the natural groups of families and genera, copious Tables and a Map illustrative of geographical distribution and habits, and a chapter on the Distribution and Origin of Species.

~~~~~

**CONCHOLOGIA ICONICA**; or, Figures and Descriptions of the Shells of Mollusks, with remarks on their Affinities, Synonymy, and Geographical Distribution. By LOVELL REEVE, F.L.S. Demy 4to, published monthly in Parts, 8 Plates, carefully coloured by hand, 10s.

Of this work, comprising illustrations of Shells of the natural size, nearly 2000 Plates are published, but the plan of publication admits of the collector purchasing it at his option in portions, each of which is complete in itself. Each genus, as the work progresses, is issued separately, with Title and Index; and an Alphabetical List of the published genera, with the prices annexed, may be procured of the publishers on application. The system of nomenclature adopted is that of Lamarck, modified to meet the exigencies of later discoveries. With the name of each species is given a summary of its leading specific characters in Latin and English; then the authority for the name is quoted, accompanied by a reference to its original description; and next in order are its Synonyms. The habitat of the species is next given, accompanied, where possible, by particulars of soil, depth, or vegetation. Finally, a few general remarks are offered, calling attention to the most obvious distinguishing peculiarities of the species, with criticisms, where necessary, on the views of other writers. At the commencement of the genus some notice is taken of the animal, and the habitats of the species are worked up into a general summary of the geographical distribution of the genus.

## FERNS.

**BRITISH FERNS;** an Introduction to the study of the FERNS, LYCOPODS, and EQUISETA indigenous to the British Isles. With Chapters on the Structure, Propagation, Cultivation, Diseases, Uses, Preservation, and Distribution of Ferns. By MARGARET PLUES. Crown 8vo, 16 Coloured Plates, drawn expressly for the work by W. FITCH, and 55 Wood-Engravings, 10s. 6d.

One of the 'New Series of Natural History for Beginners,' accurately describing all the Ferns and their allies found in Britain, with a Wood-Engraving of each Species, and Coloured Figures of 32 of the most interesting, including magnified dissections showing the Venation and Fructification.

**THE BRITISH FERNS;** or, Coloured Figures and Descriptions, with the needful Analyses of the Fructification and Venation, of the Ferns of Great Britain and Ireland, systematically arranged. By Sir W. J. HOOKER, F.R.S. Royal 8vo, 66 Plates, £2. 2s.

The British Ferns and their allies are illustrated in this work, from the pencil of Mr. FITCH. Each Species has a Plate to itself, so that there is ample room for the details, on a magnified scale, of Fructification and Venation. The whole are delicately coloured by hand. In the letterpress an interesting account is given with each species of its geographical distribution in other countries.

**GARDEN FERNS;** or, Coloured Figures and Descriptions, with the needful Analyses of the Fructification and Venation, of a Selection of Exotic Ferns, adapted for Cultivation in the Garden, Hothouse, and Conservatory. By Sir W. J. HOOKER, F.R.S. Royal 8vo, 64 Plates, £2. 2s.

A companion volume to the preceding, for the use of those who take an interest in the cultivation of some of the more beautiful and remarkable varieties of Exotic Ferns. Here also each Species has a Plate to itself, and the details of Fructification and Venation are given on a magnified scale, the Drawings being from the pencil of Mr. FITCH.

**FILICES EXOTICÆ;** or, Coloured Figures and Description of Exotic Ferns, chiefly of such as are cultivated in the Royal Gardens of Kew. By Sir W. J. HOOKER, F.R.S. Royal 4to, 100 Plates, £6. 11s.

One of the most superbly illustrated books of Foreign Ferns that has been hitherto produced. The Species are selected both on account of their beauty of form, singular structure, and their suitability for cultivation.

**FERNY COMBES;** a Ramble after Ferns in the Glens and Valleys of Devonshire. By CHARLOTTE CHANTER. *Third Edition.* Fcp. 8vo, 8 coloured plates by Fitch, and a Map of the County, 5s.

## MOSSES.

**HANDBOOK OF BRITISH MOSSES**, containing all that are known to be Natives of the British Isles. By the Rev. M. J. BERKELEY, M.A., F.L.S. Demy 8vo, pp. 360, 24 Coloured Plates, 21s.

A very complete Manual, comprising characters of all the species, with the circumstances of habitation of each; with special chapters on development and structure, propagation, fructification, geographical distribution, uses, and modes of collecting and preserving, followed by an extensive series of coloured illustrations, in which the essential portions of the plant are repeated, in every case on a magnified scale.

## SEAWEEDS.

**PHYCOLOGIA BRITANNICA**; or, History of British Seaweeds, containing Coloured Figures, Generic and Specific Characters, Synonyms and Descriptions of all the Species of Algæ inhabiting the Shores of the British Islands. By Dr. W. H. HARVEY, F.R.S. Royal 8vo, 4 vols., 765 pp., 360 Coloured Plates, £6. 6s. Reissue in Monthly Parts, each 2s. 6d.

This work, originally published in 1851, at the price of £7. 10s., is still the standard work on the subject of which it treats. Each Species, excepting the minute ones, has a Plate to itself, with magnified portions of structure and fructification, the whole being printed in their natural colours, finished by hand.

**PHYCOLOGIA AUSTRALICA**; a History of Australian Seaweeds, comprising Coloured Figures and Descriptions of the more characteristic Marine Algæ of New South Wales, Victoria, Tasmania, South Australia and Western Australia, and a Synopsis of all known Australian Algæ. By Dr. HARVEY, F.R.S. Royal 8vo, 5 vols., 300 Coloured Plates, £7. 13s.

This beautiful work, the result of an arduous personal exploration of the shores of the Australian continent, is got up in the style of the 'Phycologia Britannica' by the same author. Each Species has a Plate to itself, with ample magnified delineations of fructification and structure, embodying a variety of most curious and remarkable forms.

**NEREIS AUSTRALIS**; or, Algæ of the Southern Ocean, being Figures and Descriptions of Marine Plants collected on the Shores of the Cape of Good Hope, the extratropical Australian Colonies, Tasmania, New Zealand, and the Antarctic Regions. By Dr. HARVEY, F.R.S. Imperial 8vo, 50 Coloured Plates, £2. 2s.

A selection of Fifty Species of remarkable forms of Seaweed, not included in the 'Phycologia Australica,' collected over a wider area.



**BRITISH BEETLES;** an Introduction to the study of our Indigenous COLEOPTERA. By E. C. RYE. Crown 8vo, 16 Coloured Steel Plates, comprising Figures of nearly 100 Species, engraved from Natural Specimens, expressly for the work, by E. W. ROBINSON, and 11 Wood-Engravings of Dissections by the Author, 10s. 6d.

This little work forms the first of a New Series designed to assist young persons to a more profitable, and, consequently, more pleasurable observation of Nature, by furnishing them in a familiar manner with so much of the science as they may acquire without encumbering them with more of the technicalities, so confusing and repulsive to beginners, than are necessary for their purpose. In the words of the Preface, it is "somewhat on the scheme of a *Delectus*; combining extracts from the biographies of individual objects with principles of classification and hints for obtaining further knowledge."

---

**BRITISH BEES;** an Introduction to the study of the Natural History and Economy of the Bees indigenous to the British Isles. By W. E. SHUCKARD. Crown 8vo, 16 Coloured Steel Plates, containing nearly 100 Figures, engraved from Natural Specimens, expressly for the work, by E. W. ROBINSON, and Woodcuts of Dissections, 10s. 6d.

A companion volume to that on British Beetles, treating of the structure, geographical distribution and classification of Bees and their parasites, with lists of the species found in Britain, and an account of their habits and economy.

---

**BRITISH SPIDERS;** an Introduction to the study of the ARANEIDÆ found in Great Britain and Ireland. By E. F. STAVELEY. Crown 8vo, 16 Plates, containing Coloured Figures of nearly 100 Species, and 40 Diagrams, showing the number and position of the eyes in various Genera, drawn expressly for the work by Tuffen West, and 44 Wood-Engravings, 10s. 6d.

One of the 'New Series of Natural History for Beginners,' and companion volume to the 'British Beetles' and 'British Bees.' It treats of the structure and classification of Spiders, and describes those found in Britain, with notes on their habits and hints for collecting and preserving.

---

**INSECTA BRITANNICA;** Vols. II. and III., Diptera. By FRANCIS WALKER, F.L.S. 8vo, each, with 10 plates, 25s.

---

## ANTIQUARIAN.

### MAN'S AGE IN THE WORLD ACCORDING TO HOLY SCRIPTURE AND SCIENCE. By an ESSEX RECTOR. Demy 8vo, 264 pp., 8s. 6d.

The Author, recognizing the established facts and inevitable deductions of Science, and believing all attempts to reconcile them with the commonly received, but erroneous, literal interpretation of Scripture, not only futile, but detrimental to the cause of Truth, seeks an interpretation of the Sacred Writings on general principles, consistent alike with their authenticity, when rightly understood, and with the exigencies of Science. He treats in successive chapters of The Flint Weapons of the Drift,—The Creation,—The Paradisiacal State,—The Genealogies,—The Deluge,—Babel and the Dispersion; and adds an Appendix of valuable information from various sources.

### THE ANTIQUITY OF MAN. An Examination of Sir Charles Lyell's recent Work. By S. R. PATTISON, F.G.S. Second Edition. 8vo, 1s.

### A MANUAL OF BRITISH ARCHÆOLOGY. By CHARLES BOUTELL, M.A. Royal 16mo, 398 pp., 20 coloured plates, 10s. 6d.

A treatise on general subjects of antiquity, written especially for the student of archæology, as a preparation for more elaborate works. Architecture, Sepulchral Monuments, Heraldry, Seals, Coins, Illuminated Manuscripts and Inscriptions, Arms and Armour, Costume and Personal Ornaments, Pottery, Porcelain and Glass, Clocks, Locks, Carvings, Mosaics, Embroidery, etc., are treated of in succession, the whole being illustrated by 20 attractive Plates of Coloured Figures of the various objects.

### A SURVEY OF THE EARLY GEOGRAPHY OF WESTERN EUROPE, as connected with the First Inhabitants of Britain, their Origin, Language, Religious Rites, and Edifices. By HENRY LAWES LONG, Esq. 8vo, 6s.

### SHAKESPEARE'S SONNETS, Facsimile, by Photo-Zinco- graphy, of the First Printed edition of 1609. From the Copy in the Library of Bridgewater House, by permission of the Right Hon. the Earl of Ellesmere. 10s. 6d.

## CONCHOLOGIA ICONICA IN MONOGRAPHS.

Genera.	Plates.	£.	s.	d.	Genera.	Plates.	£.	s.	d.
ACHATINA .....	23	1	9	0	IANTHINA .....	5	0	6	6
ACHATINELLA .....	6	0	8	0	IO .....	3	0	4	0
ADAMSIELLA .....	2	0	3	0	ISOCARDIA .....	1	0	1	6
AMPHIDESMA .....	7	0	9	0	LAMPANIA .....	2	0	3	0
AMPULLARIA .....	28	1	15	6	LEIOSTRACA .....	3	0	4	0
ANASTOMA .....	1	0	1	6	LRPTOPOMA .....	8	0	10	6
ANATINA .....	4	0	5	6	LINGULA .....	2	0	3	0
ANCILLARIA .....	12	0	15	6	LITHODOMUS .....	5	0	6	6
ANCULOTUS .....	6	0	8	0	LITTORINA .....	18	1	3	0
ANOMIA .....	8	0	10	6	LUCINA .....	11	0	14	0
ARCA .....	17	1	1	6	LUTRARIA .....	5	0	6	6
ARGONAUTA .....	4	0	5	6	MACTRA .....	21	1	6	6
ARTEMIS .....	10	0	13	0	MALRUS .....	3	0	4	0
ASPERGILLUM .....	4	0	5	6	MANGELIA .....	8	0	10	6
AVICULA .....	18	1	3	0	MARGINELLA .....	27	1	14	6
BUCCINUM .....	14	0	18	0	MELANIA .....	59	3	14	6
BULIMUS .....	89	5	12	0	MELANOPSIS .....	3	0	4	0
BULLIA .....	4	0	5	6	MELATOMA .....	3	0	4	0
CALYPTREA .....	8	0	10	6	MEROR .....	3	0	4	0
CANCELLARIA .....	18	1	3	0	MESALIA & EGLISIA .....	1	0	1	6
CAPSA .....	1	0	1	6	MESODESMA .....	4	0	5	6
CAPSELLA .....	2	0	3	0	META .....	1	0	1	6
CARDITA .....	9	0	11	6	MITRA .....	39	2	9	6
CARDIUM .....	22	1	8	0	MODIOLA .....	11	0	14	0
CARINARIA .....	1	0	1	6	MONOCEROS .....	4	0	5	6
CASSIDARIA .....	1	0	1	6	MUREX .....	37	2	7	0
CASSIS .....	12	0	15	6	MYADORA .....	1	0	1	6
CERITHIDEA .....	4	0	5	6	MYOCHAMA .....	1	0	1	6
CERITHIUM .....	20	1	5	6	MYTILUS .....	11	0	14	0
CHAMA .....	9	0	11	6	NASSA .....	29	1	17	0
CHAMOSTERA .....	1	0	1	6	NATICA .....	30	1	18	0
CHITON .....	33	2	2	0	NAUTILUS .....	6	0	8	0
CHITONELLUS .....	1	0	1	6	NAVICELLA & LATIA .....	8	0	10	6
CHONDROPOMA .....	11	0	14	0	NERITA .....	19	1	4	0
CINCR .....	10	0	13	0	NERITINA .....	37	2	7	0
COLUMBELLA .....	37	2	7	0	NISO .....	1	0	1	6
CONCHOLEPAS .....	2	0	3	0	OLIVA .....	30	1	18	0
CONUS .....	56	3	11	0	ONISCIA .....	1	0	1	6
CORRULA .....	5	0	6	6	ORRICULA .....	1	0	1	6
CRANIA .....	1	0	1	6	OVULUM .....	14	0	18	0
CRASSATELLA .....	3	0	4	0	PALUDINA .....	11	0	14	0
CERNATULA .....	2	0	3	0	PALUDOMUS .....	3	0	4	0
CREPIDULA .....	5	0	6	6	PARTULA .....	4	0	5	6
CRUCIULUM .....	7	0	9	0	PATRELLA .....	42	2	13	0
CYCLOPHORUS .....	20	1	5	6	PECTEN .....	35	2	4	6
CYCLOSTOMA .....	23	1	9	0	PECTUNCULUS .....	9	0	11	6
CYCLOTUS .....	9	0	11	6	PELUM .....	1	0	1	6
CYMRUM .....	26	1	13	0	PERNA .....	6	0	8	0
CYPRÆA .....	27	1	14	6	PHASIANELLA .....	6	0	8	0
CYPRICARDIA .....	2	0	3	0	PHORUS .....	3	0	4	0
CYTHÆRA .....	10	0	13	0	PINNA .....	34	2	3	0
DELPHINULA .....	5	0	6	6	PIRENA .....	2	0	3	0
DIONE .....	12	0	15	6	PLACUNANOMIA .....	3	0	4	0
DOLIUM .....	8	0	10	6	PLEUROTOMA .....	40	2	10	6
DONAX .....	9	0	11	6	POTAMIDRS .....	1	0	1	6
EBURNA .....	1	0	1	6	PSAMMORIA .....	8	0	10	6
ERATO .....	3	0	4	0	PSAMMOTRELLA .....	1	0	1	6
EULIMA .....	6	0	8	0	PTEROCERA .....	6	0	8	0
FASCIOLARIA .....	7	0	9	0	PTEROCYCLOS .....	5	0	6	6
FICULA .....	1	0	1	6	PURPURA .....	13	0	16	6
FISSURELLA .....	16	1	0	6	PYRAMIDELLA .....	6	0	8	0
FUSUS .....	21	1	6	6	PYRAZUS .....	1	0	1	6
GLAUCONOME .....	1	0	1	6	PYRULA .....	9	0	11	6
HALIA .....	1	0	1	6	RANELLA .....	8	0	10	6
HALIOTIS .....	17	1	1	6	RICINULA .....	6	0	8	0
HARPA .....	4	0	5	6	ROSTELLARIA .....	3	0	4	6
HELIX .....	210	13	5	0	SANGUINOLARIA .....	1	0	1	6
HEMIPRCTEN .....	1	0	1	6	SCARÆUS .....	3	0	4	0
HEMISINUS .....	6	0	8	0	SIGARETUS .....	5	0	6	6
HINNITES .....	1	0	1	6	SIMPULOPSIS .....	2	0	3	0
HIPPOPUS .....	1	0	1	6	SIPHONARIA .....	7	0	9	0

Genera.	Plates.	£.	s.	d.	Genera.	Plates.	£.	s.	d.
SOLARIUM.....	3	0	4	0	TRITON.....	20	1	5	6
SOLETELLINA.....	4	0	5	6	TROCHITA.....	3	0	4	0
SPONDYLUS.....	18	1	3	0	TROCHUS.....	16	1	0	6
STROMBUS.....	19	1	4	0	TUGONIA.....	1	0	1	6
STRUTHIOLARIA.....	1	0	1	6	TURBINELLA.....	13	0	16	6
TAPES.....	13	0	16	6	TURBO.....	13	0	16	6
TELESCOPIUM.....	1	0	1	6	TURRITELLA.....	11	0	14	0
TEREBRA.....	27	1	14	6	TYMPANOTONOS.....	2	0	3	0
TEREBELLUM.....	1	0	1	6	UMBRELLA.....	1	0	1	6
TEREBRATULA & RYN-					VENUS.....	26	1	13	0
CHONELLA.....	11	0	14	0	VERTAGUS.....	5	0	6	6
THRACIA.....	3	0	4	0	VITRINA.....	10	0	13	0
TORNATELLA.....	4	0	5	6	VOLUTA.....	22	1	8	0
TRIDACNA.....	8	0	10	6	VULSELLA.....	2	0	3	0
TRIGONIA.....	1	0	1	6	ZIZYPHINUS.....	8	0	10	6

CONCHOLOGIA SYSTEMATICA ; or, Complete System of  
Conchology. By LOVELL REEVE, F.L.S. Demy 4to, 2 vols. pp. 537,  
300 Plates, £10. 10s. coloured.

Of this work only a few copies remain. It is a useful companion to the collector of shells, on account of the very large number of specimens figured, as many as six plates being devoted in some instances to the illustration of a single genus.

INSECTS.

CURTIS'S BRITISH ENTOMOLOGY. Illustrations and

Descriptions of the Genera of Insects found in Great Britain and Ireland, containing Coloured Figures, from nature, of the most rare and beautiful species, and, in many instances, upon the plants on which they are found. Royal 8vo, 8 vols., 770 Plates, coloured, £21.

Or in separate Monographs.

Orders.	Plates.	£.	s.	d.	Orders.	Plates.	£.	s.	d.
APHANIPTERA.....	2	0	2	0	HYMENOPTERA.....	125	4	0	0
COLBOPTERA.....	256	8	0	0	LEPIDOPTERA.....	193	6	0	0
DERMAPTERA.....	1	0	1	0	NEUROPTERA.....	13	0	9	0
DICTYOPTERA.....	1	0	1	0	OMALOPTERA.....	6	0	4	6
DIPTERA.....	103	3	5	0	ORTHOPTERA.....	5	0	4	0
HEMIPTERA.....	32	1	1	0	STREPSIPTERA.....	3	0	2	6
HOMOPTERA.....	21	0	14	0	TRICHOPTERA.....	9	0	6	6

'Curtis's Entomology,' which Cuvier pronounced to have "reached the ultimatum of perfection," is still the standard work on the Genera of British Insects. The Figures executed by the author himself, with wonderful minuteness and accuracy, have never been surpassed, even if equalled. The price at which the work was originally published was £43. 16s.



**THE BEWICK COLLECTOR.** A Descriptive Catalogue of the Works of THOMAS and JOHN BEWICK, including Cuts, in various states, for Books and Pamphlets, Private Gentlemen, Public Companies, Exhibitions, Races, Newspapers, Shop Cards, Invoice Heads, Bar Bills, Coal Certificates, Broad-sides, and other miscellaneous purposes, and Wood Blocks. With an Appendix of Portraits, Autographs, Works of Pupils, etc. The whole described from the Originals contained in the Largest and most Perfect Collection ever formed, and illustrated with a Hundred and Twelve Cuts from Bewick's own Blocks. By the Rev. THOMAS HUGO, M.A., F.S.A., the Possessor of the Collection. Demy 8vo, pp. 562, price 21s.; imperial 8vo (limited to 100 copies), with a fine Steel Engraving of Thomas Bewick, £2. 2s. The Portrait may be had separately, on imperial folio, price 7s. 6d.

**WHITNEY'S "CHOICE OF EMBLEMES;"** a Facsimile Reprint by Photo-lithography. With an Introductory Dissertation, Essays Literary and Bibliographical, and Explanatory Notes. By HENRY GREEN, M.A. Post 4to, pp. lxxxviii., 468. 72 Facsimile Plates, 42s.

A beautiful and interesting reproduction by Photo-lithography of one of the best specimens of this curious class of literature of the sixteenth century. An Introductory Dissertation of eighty-eight pages traces the history of Emblematic Literature from the earliest times, and gives an Account of the Life and Writings of Geoffrey Whitney, followed by an Index to the Mottoes, with Translations and some Proverbial Expressions. The facsimile reproduction of the 'Emblems, with their quaint pictorial Illustrations, occupies 230 pages. Then follow Essays on the Subjects and Sources of the Mottoes and Devices, on Obsolete Words in Whitney, with parallels, chiefly from Chaucer, Spenser, and Shakespeare; Biographical Notices of some other emblem-writers to whom Whitney was indebted; Shakespeare's references to emblem-books, and to Whitney's emblems in particular; Literary and Biographical Notes explanatory of some of Whitney's emblems, and of the persons to whom they are dedicated. Seventy-two exceedingly curious plates, reproduced in facsimile, illustrate this portion of the work, and a copious General Index concludes the volume.

## TRAVELS.

**THREE CITIES IN RUSSIA.** By Professor C. PIAZZI SMYTH, F.R.S. Post 8vo, 2 vols., 1016 pp. Maps and Wood-Engravings, 26s.

The narrative of a tour made in the summer of 1859 by the Astronomer Royal of Scotland, to the cities of St. Petersburg, Moscow, and Novgorod.

**TRAVELS ON THE AMAZON AND RIO NEGRO;** with an Account of the Native Tribes, and Observations on the Climate, Geology, and Natural History of the Amazon Valley. By ALFRED R. WALLACE. Demy 8vo, 541 pp., with Map and Tinted Frontispiece, 18s.

A lively narrative of travels in one of the most interesting districts of the Southern Hemisphere, accompanied by Remarks on the Vocabularies of the Languages, by Dr. R. G. LATHAM.

**WESTERN HIMALAYA AND TIBET**; a Narrative of a Journey through the Mountains of Northern India, during the Years 1847-1848. By Dr. THOMSON, F.R.S. Demy 8vo, 500 pp., with Map and Tinted Frontispiece, 15s.

A summary of the physical features, chiefly botanical and geological, of the country travelled over in a mission undertaken for the Indian Government, from Simla across the Himalayan Mountains into Tibet, and to the summit of the Karakoram Mountains; including also an excellent description of Kashmir.

**TRAVELS IN THE INTERIOR OF BRAZIL**, principally through the Northern Provinces and the Gold and Diamond Districts, during the years 1836-1841. By Dr. GEORGE GARDNER, F.L.S. Second Edition. Demy 8vo, 428 pp., with Map and Tinted Frontispiece, 12s.

The narrative of an arduous journey, undertaken by an enthusiastic naturalist, through Brazil Proper, Bahia, Maranhão, and Pernambuco, written in a lively style, with glowing descriptions of the grandeur of the vegetation.

**MISCELLANEOUS.**

**LIVE COALS**; or, Faces from the Fire. By Miss BUDGEN, "Acheta," Author of 'Episodes of Insect Life,' etc. Dedicated, by Special Permission, to H.R.H. Field-Marshal the Duke of Cambridge. Royal 4to, 35 Original Sketches printed in colours, 42s.

The 'Episodes of Insect Life,' published in three series some years since, and so favourably received, will pleasantly recall to the mind of every one acquainted with that Work the power of graphic description, the playful fancy, the fertile imagination, and the humorous and artistic pencil of its gifted Author. The talent and genius therein displayed won, unsolicited, from the late Prince Consort, a graceful acknowledgment in the presentation to the Author of a copy of a book, 'The Natural History of Deeside,' privately printed by command of Her Majesty the Queen. The above Work comprises a series of Thirty-five highly imaginative and humorous Sketches, suggested by burning Coals and Wood, accompanied by Essays, descriptive and discursive, on:—The Imagery of Accident—The Fire in a New Light—The Fire an Exhibitor—The Fire a Sculptor.

**METEORS, AEROLITES, AND FALLING STARS.** By Dr. T. L. PHIPSON, F.C.S. Crown 8vo. 25 Woodcuts and Lithographic Frontispiece, 6s.

A very complete summary of Meteoric Phenomena, from the earliest to the present time, including the shower of November, 1866, as observed by the Author.

---

**THE REASONING POWER IN ANIMALS.** By the Rev.

J. S. WATSON, M.A. 480 pp. Crown 8vo, 9s.

The object of the above treatise is to trace the evidences of the existence in the lower animals of a portion of that reason which is possessed by man. A large number of carefully-selected and well-authenticated anecdotes are adduced of various animals having displayed a degree of intelligence distinct from instinct, and called into activity by circumstances in which the latter could have been no guide.

---

**MANUAL OF CHEMICAL ANALYSIS,** Qualitative and

Quantitative; for the Use of Students. By Dr. HENRY M. NOAD, F.R.S. Crown 8vo, pp. 663, 109 Wood Engravings, 16s. Or, separately, Part I., 'QUALITATIVE,' 6s.; Part II., 'QUANTITATIVE,' 10s. 6d.

A Copiously-illustrated, Useful, Practical Manual of Chemical Analysis, prepared for the Use of Students by the Lecturer on Chemistry at St. George's Hospital. The illustrations consist of a series of highly-finished Wood-Engravings, chiefly of the most approved forms and varieties of apparatus.

---

**PHOSPHORESCENCE; or, the Emission of Light by Mine-**

erals, Plants, and Animals. By Dr. T. L. PHIPSON, F.C.S. Small 8vo, 225 pp., 30 Wood Engravings and Coloured Frontispiece, 5s.

An interesting summary of the various phosphoric phenomena that have been observed in nature,—in the mineral, in the vegetable, and in the animal world.

---

**DICTIONARY OF NATURAL HISTORY TERMS,** with

their Derivatives, including the various Orders, Genera, and Species. By DAVID H. M'NICOLL, M.D. Crown 8vo, 584 pp., 12s. 6d.

An attempt to furnish what has long been a desideratum in natural history,—a dictionary of technical terms, with their meanings and derivatives.

---

**THE ZOOLOGY OF THE VOYAGE OF H.M.S. SA-**

MARANG, under the command of Captain Sir Edward Belcher, C.B., during the Years 1843-46. By Professor OWEN, Dr. J. E. GRAY, Sir J. RICHARDSON, A. ADAMS, L. REEVE, and A. WHITE. Edited by ARTHUR ADAMS, F.L.S. Royal 4to, 257 pp., 55 Plates, mostly coloured, £3. 10s.

In this work, illustrative of the new species of animals collected during the surveying expedition of H.M.S. Samarang in the Eastern Seas in the years 1843-1846, there are 7 Plates of Quadrupeds, 1 of Reptiles, 10 of Fishes, 24 of Mollusca and Shells, and 13 of Crustacea. The Mollusca, which are particularly interesting, include the anatomy of *Spirula* by Professor Owen, and a number of beautiful Figures of the living animals by Mr. Arthur Adams.

THE GEOLOGIST. A Magazine of Geology, Palæontology, and Mineralogy. Illustrated with highly finished Wood-Engravings. Edited by S. J. MACKIE, F.G.S., F.S.A. Vols. V. and VI., each, with numerous Wood-Engravings, 18s. Vol. VII., 9s.

---

LITERARY PAPERS ON SCIENTIFIC SUBJECTS.

By the late Professor EDWARD FORBES, F.R.S., selected from his Writings in the 'Literary Gazette.' With a Portrait and Memoir. Small 8vo, 6s.

---

THE PLANETARY AND STELLAR UNIVERSE. A

Series of Lectures. With Illustrations. By R. J. MANN. 12mo, 5s.

---

GUIDE TO COOL-ORCHID GROWING. By JAMES

BATEMAN, Esq., F.R.S., Author of 'The Orchidaceæ of Mexico and Guatemala.' Woodcuts, 1s.

---

A TREATISE ON THE GROWTH AND FUTURE

TREATMENT OF TIMBER TREES. By G. W. NEWTON, of Ollersett, J.P. Half-bound calf, 10s. 6d.

---

PARKS AND PLEASURE GROUNDS; or, Practical

Notes on Country Residences, Villas, Public Parks, and Gardens. By CHARLES H. J. SMITH, Landscape Gardener. Crown 8vo, 6s.

---

THE STEREOSCOPIC MAGAZINE. A Gallery for the

Stereoscope of Landscape Scenery, Architecture, Antiquities, Natural History, Rustic Character, etc. With Descriptions. 5 vols., each complete in itself and containing 50 Stereographs, £2. 2s.

---

THE CONWAY. Narrative of a Walking Tour in North

Wales; accompanied by Descriptive and Historical Notes. By J. B. DAVIDSON, Esq., M.A. Extra gilt, 20 Stereographs of Welsh Scenery, 21s.

---

THE ARTIFICIAL PRODUCTION OF FISH. By PISCARIUS.

Third Edition. 1s.

---



## RECENTLY PUBLISHED.



THE REASONING POWER IN ANIMALS. By the Rev.  
J. S. WATSON. 9s.

LIVE COALS; or, Faces from the Fire. By the Author of  
'Episodes of Insect Life.' 42s.

PHIPSON'S METEORS, AEROLITES, AND FALLING  
STARS. 6s.

BENTHAM'S HANDBOOK OF THE BRITISH FLORA.  
New Edition, 12s.

BENTHAM'S ILLUSTRATED BRITISH FLORA. Two  
Vols. 8vo, 1295 Wood-Engravings, 70s.

SECOND CENTURY OF ORCHIDACEOUS PLANTS.  
Edited by JAMES BATEMAN, Esq. Royal 4to, Part V., with 10 Coloured  
Plates, 10s. 6d.

BATEMAN'S ODONTOGLOSSUM. Imperial Folio. Part  
III., with 5 Coloured Plates, 21s.

PLUES'S BRITISH FERNS. Crown 8vo, 16 Coloured  
Plates, 10s. 6d.

RYE'S BRITISH BEETLES. Crown 8vo, 16 Coloured  
Plates, 10s. 6d.

SHUCKARD'S BRITISH BEES. Crown 8vo, 16 Coloured  
Plates, 10s. 6d.

STAVELEY'S BRITISH SPIDERS. Crown 8vo, 16 Co-  
loured Plates, 10s. 6d.

BENTHAM'S FLORA AUSTRALIENSIS. Vol. III. 20s.

HOOKE'S FLORA OF NEW ZEALAND. Part I. 16s.

SEEMANN'S FLORA VITIENSIS. Royal 4to. Part V.,  
with 10 Coloured Plates, 15s.

HUGO'S "BEWICK COLLECTOR." Demy 8vo, 21s.;  
Imperial 8vo, with Portrait of T. Bewick, 42s.

GREEN'S "WHITNEY'S CHOICE OF EMBLEMES."  
Facsimile reproduction, Post 4to, 42s.

MAN'S AGE IN THE WORLD. By an Essex Rector.  
8s. 6d.

## NEW SERIES OF NATURAL HISTORY FOR BEGINNERS.

---

\*\*\* A good introductory series of books on Natural History for the use of students and amateurs is still a *desideratum*. Those at present in use have been too much compiled from antiquated sources; while the figures, copied in many instances from sources equally antiquated, are far from accurate, the colouring of them having become degenerated through the adoption, for the sake of cheapness, of mechanical processes.

The present series will be entirely the result of original research carried to its most advanced point; and the figures, which will be chiefly engraved on steel, by the artist most highly renowned in each department for his technical knowledge of the subjects, will in all cases be drawn from actual specimens, and coloured separately by hand.

Each work will treat of a department of Natural History sufficiently limited in extent to admit of a satisfactory degree of fulness; a closer study of a limited subject being both more interesting, and preferable as a mental discipline, than a superficial acquaintance with a wider range.

---

The following are now ready:—

**BRITISH BEETLES**; an Introduction to the Study of our Indigenous COLEOPTERA. By E. C. RYE. Crown 8vo, 16 Coloured Steel Plates, comprising Figures of nearly 100 Species, engraved from Natural Specimens, expressly for the work, by E. W. ROBINSON, and 11 Wood-Engravings of Dissections by the Author, 10s. 6d.

---

**BRITISH BEES**; an Introduction to the Study of our Natural History and Economy of the Bees indigenous to the British Isles. By W. E. SHUCKARD. Crown 8vo, 16 Coloured Steel Plates, containing nearly 100 Figures, engraved from Natural Specimens, expressly for the work, by E. W. ROBINSON, and Woodcuts of Dissections, 10s. 6d.

---

**BRITISH SPIDERS**; an Introduction to the Study of the ARANEIDÆ found in Great Britain and Ireland. By E. F. STAVELEY. Crown 8vo, 16 Plates, containing Coloured Figures of nearly 100 Species, and 40 Diagrams, showing the number and position of the eyes in various Genera, drawn expressly for the work by TUFFEN WEST, and 44 Wood-Engravings, 10s. 6d.

---

**BRITISH FERNS**; an Introduction to the Study of the Ferns, LYCOPODS, and EQUISETA indigenous to the British Isles. With Chapters on the Structure, Propagation, Cultivation, Diseases, Uses, Preservation, and Distribution of Ferns. By MARGARET PLUES. Crown 8vo, 16 Coloured Plates, drawn expressly for the work by W. FITCH, and 55 Wood-Engravings, 10s. 6d.

---

NEW SERIES OF NATURAL HISTORY FOR  
BEGINNERS—*continued.*

---

◆

The following are in preparation:—

BRITISH BUTTERFLIES AND MOTHS; an Introduction to the study of the LEPIDOPTERA of Britain. By H. T. STAINTON. Crown 8vo, 16 Coloured Plates, and Wood-Engravings, 10s. 6d.

~~~~~

BRITISH SEAWEEDS; an Introduction to the study of the Marine ALGÆ of Britain. By S. O. GRAY. Crown 8vo, 16 Coloured Plates, and Wood-Engravings, 10s. 6d.

~~~~~

BRITISH FLIES; an Introduction to the study of the DIPTERA of Britain. By W. E. SHUCKARD. Crown 8vo, 16 Coloured Plates, and Wood-Engravings, 10s. 6d.

~~~~~

BRITISH WASPS AND ANTS; an Introduction to the study of the HYMENOPTERA of Britain. By W. E. SHUCKARD. Crown 8vo, 16 Coloured Plates, and Wood-Engravings, 10s. 6d.

~~~~~

BRITISH INSECTS; an Introduction to the study of the Insects of Britain. By E. F. STAVELEY. Crown 8vo, 16 Coloured Plates, and Wood-Engravings, 10s. 6d.

~~~~~

BRITISH GRASSES; an Introduction to the study of the Grasses found in the British Isles. By M. PLUES. Crown 8vo, 16 Coloured Plates, and numerous Wood-Engravings, 10s. 6d.

And other Works.

---

# FORTHCOMING WORKS.

SUNSHINE AND SHOWERS; their Influence throughout  
Creation. By ANDREW STEINMETZ. *[In the press.]*

THE EDIBLE MOLLUSKS OF BRITAIN. By M. S.  
LOVELL. *[In the press.]*

BRITISH GRASSES. By M. PLUES. *[In the press.]*

BRITISH BUTTERFLIES AND MOTHS. By H. T.  
STAINTON. *[In preparation.]*

BRITISH FLIES. By W. E. SHUCKARD. *[In preparation.]*

BRITISH WASPS. By W. E. SHUCKARD. *[In preparation.]*

BRITISH INSECTS. By E. F. STAVELEY. *[In preparation.]*

BRITISH SEAWEEDS. By S. O. GRAY. *[In preparation.]*

THE YOUNG COLLECTOR'S HANDY BOOK OF BO-  
TANY. By the Rev. H. P. DUNSTER.

THE YOUNG COLLECTOR'S HANDY BOOK OF RE-  
CREATIVE SCIENCE. By the Rev. H. P. DUNSTER.

SECOND CENTURY OF ORCHIDACEOUS PLANTS.  
By JAMES BATEMAN, Esq. Part VI.

MONOGRAPH OF ODONTOGLOSSUM. By JAMES  
BATEMAN, Esq. Part IV.

FLORA VITIENSIS. By Dr. SEEMANN. Part VI.

FLORA OF NEW ZEALAND. By Dr. HOOKER. Part II.  
*[Nearly ready.]*

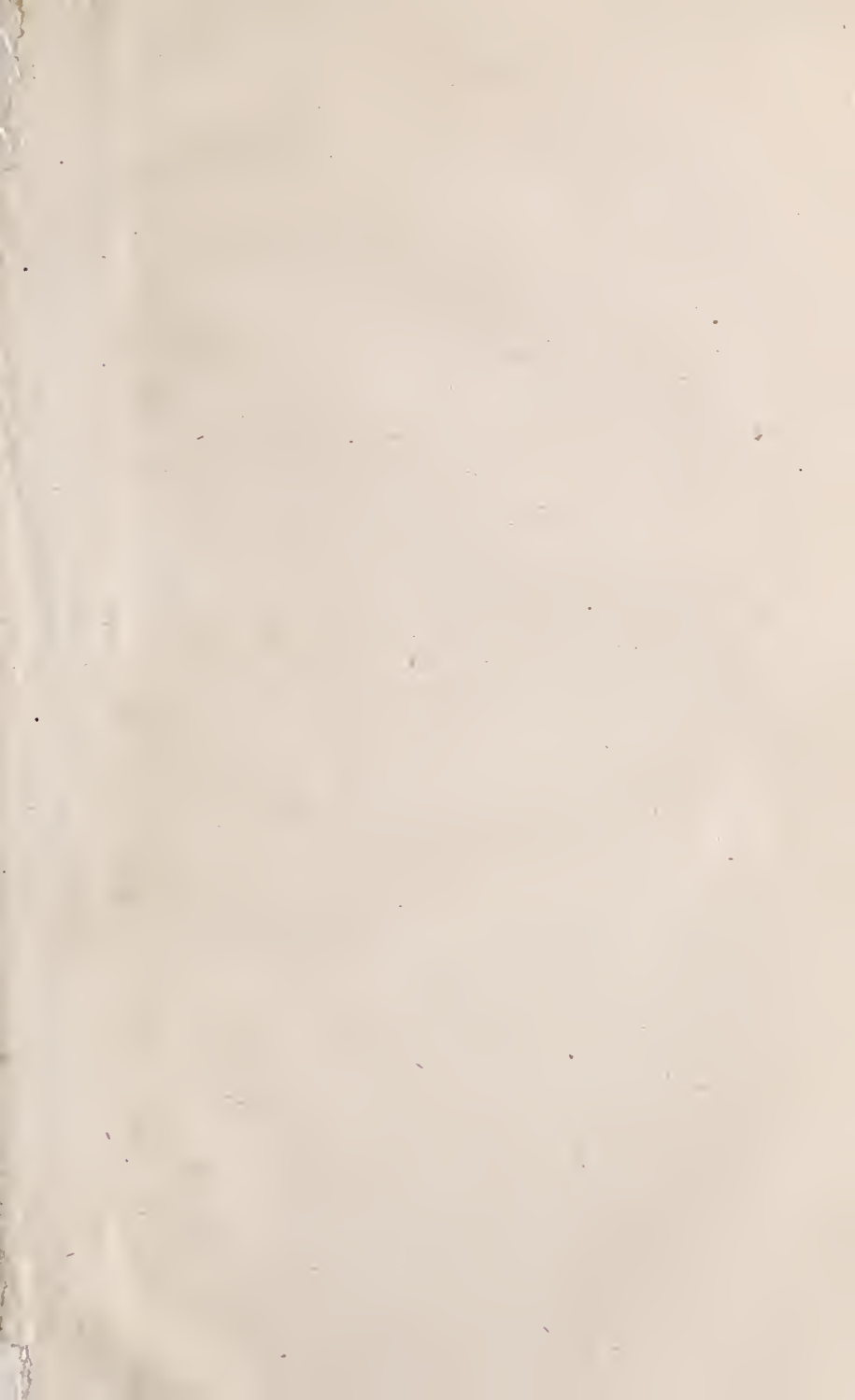
FLORA AUSTRALIENSIS. By G. BENTHAM. Vol. IV.

---

LONDON :

REEVE & CO., 5, HENRIETTA STREET, COVENT GARDEN.







New York Botanical Garden Library

QK 460 .H6

Hooker, Joseph Dalt/Handbook of the New gen



3 5185 00111 0137



